Product Data

48HJD,HJF015-025 50HJ015-025 Single Package Rooftop Units

12 to 20 Nominal Tons

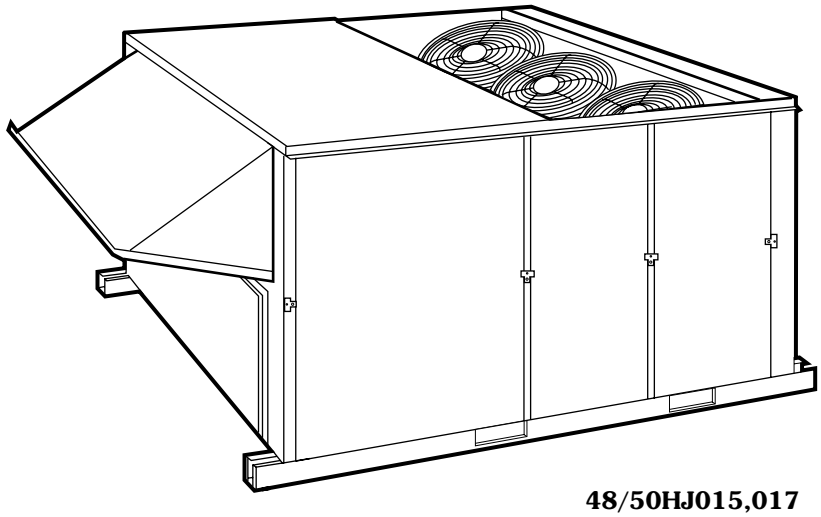
Quality Assurance

Carrier Corporation UL REGISTERED FIRM ISO 9002 #A2260

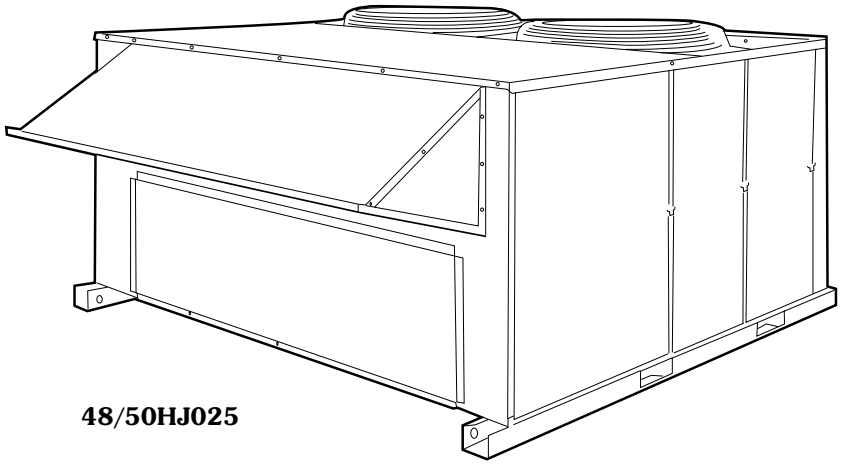
BSI REGISTERED FIRM — NATIONAL ACCREDITATION OF CERTIFICATION BODIES

Certificate No FM 21837

Approvals:
ISO 9002
EN 29002
BS5750 PART 2
ANSI/ASQC Q92



48/50HJ015,017



48/50HJ025

High Performance, Single Package Rooftop Units with:

- Cooling EERs up to 10.8
- Dual, electrically and mechanically independent refrigerant circuits
- Scroll compressors on each circuit
- TXV refrigerant metering devices
- Pre-painted galvanized steel cabinet for long life and quality appearance
- Non-corrosive, sloped condensate drain pans meet ASHRAE 62-99 (IAQ)
- Two-inch return air filters
- Heating options:
  - — Natural gas (48HJ Only)
  - — LP gas (48HJ Only)
  - — Electric heat (50HJ Only)
  - — Hydronic glycol heating coil (50HJ Only)
- Optional MoistureMi$er Dehumidification package

Features/Benefits

Every compact one-piece unit arrives fully assembled, charged, tested, and ready to run.

Cooling EERs

The 48/50HJ015 (12 tons) and 017 (15 tons) units provide ARI (Air Conditioning and Refrigeration Institute) certified cooling EERs (Energy Efficiency Ratios) of 10.6/10.7 and 10.5/10.8, respectively. The fully-rated 20-ton 48/50HJ025 has an EER of 9.3/9.5. These exceptionally high ratings assure minimum operating costs and will qualify for attractive utility rebates in many areas.

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Durable, dependable construction

Designed for durability in any climate, the weather-resistant cabinets are constructed of galvanized steel, bonderized, and all exterior panels are coated with a prepainted baked enamel finish. The paint finish is non-chalking, and is capable of withstanding ASTM B117 500-hour Salt Spray Test. All internal cabinet panels are primed, permitting longer life and a more attractive appearance for the entire unit. Totally enclosed condenser-fan motors and permanently lubricated bearings provide additional unit dependability.

Easy installation

All units fit one size roof curb. The contractor can order and install the roof curb early in the construction stage, before decisions on size requirements are made.

All units feature base rail design with forklift slots and rigging holes for easier maneuvering. Durable packaging protects all units during shipment and storage.

The units can be easily converted from a vertical to a horizontal discharge configuration by using the horizontal supply/return adapter roof curbs.

NOTE: On units using horizontal supply and return, the accessory barometric relief or power exhaust MUST be installed on the return ductwork.

Convenient duct openings in the unit basepans permit side-by-side or concentric duct connections (see Application data section on page 64) without requiring internal unit modification.

Factory- and field-installed electric heaters are available in a wide range of capacities (50HJ). Gas heat is available on 48HJ units.

Indoor-air quality begins with Carrier rooftops

Sloped condensate pans minimize biological growth in rooftop units in accordance with ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) Standard 62. Two-in. filters with optional dirty filter indicator switch provide for greater particle reduction in the return air. The face-split evaporator coils improve the dehumidification capability of the standard units, and accessory enthalpy controls available for use with the optional economizers maximize building humidity control.

Exclusive MoistureMi$er Dehumidification Package

The MoistureMi$er dehumidification package is a result of recent advances by Carrier in controlling comfort levels. This factory-installed option significantly improves the dehumidification capability of the rooftop unit and helps control humidity levels in the building.

This option provides increased dehumidification by cooling the hot liquid refrigerant leaving the condenser coil. The MoistureMi$er consists of a subcooling coil located on the leaving-air side of the evaporator coil. The location of this coil in the indoor airstream enhances the latent capacity of the 48/50HJ units by as much as 40%. Many buildings suffer from humidity damage or poor indoor air quality due to humid conditions. The improved latent capacity provided by the MoistureMi$er option reduces the building's humidity, eliminating potential property damage and making the space more comfortable.

The MoistureMi$er option makes the 48/50HJ unit the ideal IAQ rooftop for hot and humid regions. The operation of the MoistureMi$er package can be controlled by a field-installed, wall mounted humidistat or thermidistat. The circuit activates only when needed (using the accessory humidistat) as opposed to some dehumidification systems that operate continuously. The humidistat or thermidistat can be set for any humidity levels between 20% and 80% relative humidity.

Simple electrical connections

Terminal boards, located in the base unit control box, facilitate connections to room thermostat, outdoor thermostat(s), economizer, and electric heat. Service panels are quickly removed, permitting easy servicing.

Thru-the-curb service connections allow power and control wiring to be routed through the curb, minimizing roof penetrations. Both power and control connections are made on the same side of the unit to simplify installation. In addition, color-coded wires permit easy tracing and diagnostics.

Integrated economizers and outdoor air

During a first stage call for cooling, if the outdoor-air temperature is below the control changeover set point, the discharge-air sensor modulates the economizer outdoor-air damper open to achieve the set point. When second-stage cooling is called for, the first stage compressor is energized in addition to the economizer. If the outdoor-air temperature is above the changeover set point, the first stage of compression is activated and the economizer stays at vent position. Economizer operation is controlled by Accusensor™ I dry-bulb thermostat that senses outdoor-air temperature. Accessory (field-installed) upgrade kits include solid-state enthalpy sensor control and differential enthalpy sensor.

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Features/Benefits (cont)

For units without economizer, year-round ventilation is enhanced by a manual outdoor-air damper. The damper can be preset to admit up to 25% outdoor air.

In addition, the barometric relief damper or power exhaust accessory can be utilized to help maintain proper building pressure.

Quiet, efficient operation and dependable performance

Scroll compressors have vibration isolators for extremely quiet operation. Efficient fan and motor design permits operation at very low sound levels.

These units offer high energy efficiency and lower utility costs through part load operation using 2 stages of cooling. Each stage of cooling has its own scroll compressor and independent refrigerant circuit. Each circuit features a thermostatic expansion valve (TXV) for refrigerant metering.

Quiet and efficient operation is provided by belt-driven evaporator fans. The belt-driven evaporator-fan with variable-pitch pulleys allows adjustment to available static pressure to meet the job requirements of even the most demanding applications. A standard (low-medium static) and alternate (high static) indoor fan drive is available for these units.

Gas heating units

Integrated gas unit controller (IGC) (48HJ models) — All ignition components are contained in the compact IGC which is easily accessible for servicing. The IGC control board, designed and manufactured exclusively for Carrier rooftop units, provides built-in diagnostic capability. An LED (light-emitting diode) simplifies troubleshooting by providing visual fault notification and system status confirmation.

The IGC also contains an exclusive anti-cycle protection for gas heat operation. After 4 continuous cycles on the unit high-temperature limit switch, the gas heat operation is disabled, and an error code is issued. This feature greatly improves reliability of the rooftop unit.

The IGC also contains burner control logic for accurate and dependable gas ignition. The LED is visible without removing the unit control box access panel. This LED fault-notification system reduces service person troubleshooting time and minimizes service costs. The IGC also maximizes heating efficiency by controlling evaporator-fan on and off delays.

Efficient, dependable operation — Tubular, dimpled gas heat exchangers optimize heat transfer for improved efficiency. The tubular design permits hot gases to make multiple passes across the path of the supply air. The dimpled design creates a turbulent gas flow to maximize heating efficiency. The extra thick Alumagard™ heat exchanger coating provides corrosion resistance and ensures long life.

The unsightly appearance of flue stacks is eliminated and the effects of wind on heating operations are diminished by the induced draft combustion system. The inducer fan draws hot combustion gas through the heat exchanger at the optimum rate for the most effective heat transfer. The heat exchanger operates under negative pressure, preventing flue gas leakage into the indoor supply air.

During the Heating mode, the evaporator-fan relay automatically starts the evaporator fan after the heat exchanger warms up to a suitable temperature. The 30-second fan delay prevents cold air from entering the supply duct system when the conditioned space is calling for heat to maximize efficiency.

The direct-spark ignition system saves operating expense when compared to pilot ignition systems. No crossover tube is required, therefore no sooting or pilot fouling problems can occur.

All 48HJ standard units are designed for natural gas, but an accessory LP (liquid propane) conversion kit is available, if required.

Safety is built in — All 48HJ units have a flame rectification sensor to quickly sense the burner flame and ignite burners almost immediately. Fast shutdown is a certainty since the sensor reacts quickly to any flame outage or system failure. In the event of a shutdown, an error code is issued at the IGC board.

Safety is also assured due to the heating safety controls which will shut down the unit if there is a problem. If excessive temperatures develop, limit switches shut off the gas valve. After 4 continuous short cycles of the high-temperature limit switch, the IGC board locks out the gas heat cycle to prevent any further short cycles. This safety feature is provided exclusively on Carrier rooftop units. The rollout switch also deenergizes the gas valve in the event of a flame rollout.

Carrier Apollo controls add reliability, efficiency, and simplification

The Apollo direct digital controls are ordered as a factory-installed option. Designed and manufactured exclusively by Carrier, the controls can be used to actively monitor and control all modes of operation, as well as to monitor evaporator-fan status, filter status, indoor-air quality (humidity and carbon dioxide), supply-air temperature, and outdoor-air temperature.

The Apollo communicating controls are factory-installed into the unit control box, and come equipped with built-in diagnostic capabilities. Light-emitting diodes (LEDs) simplify troubleshooting by indicating thermostat commands for both stages of heating and cooling, evaporator fan operation, and economizer operation. The Apollo communicating controls are designed to work specifically with the Carrier TEMP and VVT® (variable volume and temperature) thermostats. The Apollo controls, combined with Carrier thermostats, incorporate a 5-minute recycle delay timer between modes of operation to prevent short cycling.

The standard rooftop control system is readily adaptable to all conventional and programmable thermostats. In addition, units with the Apollo controls are suitable for integration into the CCN building control systems if required. This system gives these units the flexibility to communicate with almost any thermostat or Carrier Comfort Network (CCN) thermostat.

Service options

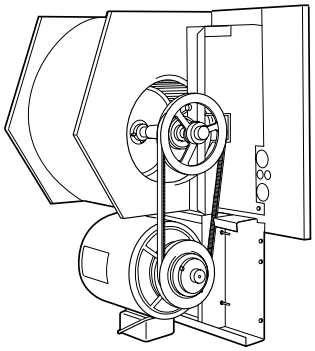
Servicing a rooftop unit has never been easier with the new factory-installed service options for these rooftop units. The service options include:

- Hinged access panels for the filter/indoor-fan motor, compressors, evaporator fan, and control box areas. Quick access to major components is accomplished by simply unlatching and swinging open the

Features/Benefits (cont)

various panels. Each hinged panel is permanently mounted to the unit, thereby eliminating the concern of a dropped or wind-blown panel puncturing delicate roof materials. The 4 extended access panels are also equipped with ''tie back'' retaining devices to hold the door in the open position while servicing the unit.

- An external, covered, 115-v Ground Fault Interrupt (GFI) receptacle as a convenient power source for drills, lights, refrigerant recovery units, or other electrical service tools. Simply connect the outlet to a field-supplied and properly fused branch circuit power supply.
- An integral non-fused disconnect switch within the rooftop unit reduces installation time, labor and material costs. Safety is assured by an interlock which prevents access to the control box unless the switch is in the OFF position. In addition, the externally mounted handle incorporates power lockout capability to further protect service personnel.



UNIQUE SLIDE-OUT MOTOR MOUNT (017,025)

Model number nomenclature

48HJ D 025 Z – C 6 – – YA

Product Series Type
48HJ – Single Package Rooftop Units, Gas Heating/Electric Cooling
50HJ – Single Package Rooftop Units, Electric Cooling/ Optional Electric Heat

Heating Capacity
D – Low Heat (48HJ Only)
F – High Heat (48HJ Only)
– – No Heat (50HJ Only)

Nominal Capacity – Tons
015 – 12 Tons
017 – 15 Tons
025 – 20 Tons

Service/Control Options
– – Standard Controls
G – Service Option
J – Hinged Access Panels
S – Hinged Access Panels with Apollo Control
Y – Service Option with Apollo Control
Z – Apollo Control

Factory-Installed Options Code*

Voltage Description
1 – 575-3-60
5 – 208/230-3-60
6 – 460-3-60

Coil Protection Options
– – Al/Cu Condenser and Evaporator
B – Cu/Cu Condenser and Evaporator
C – Cu/Cu Condenser and Al/Cu Evaporator
F – E-Coated Al/Cu Condenser and Al/Cu Evaporator
G – E-Coated Cu/Cu Condenser and Al/Cu Evaporator
V – Al/Cu Precoated Condenser Fins

LEGEND
Al — Aluminum
Cu — Copper

*Refer to 48HJ or 50HJ price pages or contact your local Carrier representative for FIOP code table.

ARI* capacity ratings

UNIT 48HJD	NOMINAL TONS	STANDARD CFM	NET COOLING CAPACITY (Btuh)	TOTAL WATTS	EER	SOUND RATING (Bels)	IPLV
015	12	3600	134,000	12,209	10.60	8.8	11.4
017	15	5300	180,000	17,064	10.50	8.8	11.4
025	20	6100	232,000	24,847	9.30	9.4	9.50

UNIT 48HJF	NOMINAL TONS	STANDARD CFM	NET COOLING CAPACITY (Btuh)	TOTAL WATTS	EER	SOUND RATING (Bels)	IPLV
015	12	3600	134,000	12,218	10.60	8.8	11.4
017	15	5300	180,000	17,179	10.50	8.8	11.1
025	20	6100	232,000	24,996	9.30	9.4	9.40

UNIT 50HJ	NOMINAL TONS	STANDARD CFM	NET COOLING CAPACITY (Btuh)	TOTAL WATTS	EER	SOUND RATING (Bels)	IPLV
015	12	3600	134,000	12,128	10.70	8.8	11.6
017	15	5300	180,000	16,828	10.80	8.8	11.7
025	20	6100	234,000	24,574	9.50	9.4	9.7

LEGEND

Bels — Sound Levels (1 bel = 10 decibels)
db — Dry Bulb
EER — Energy Efficiency Ratio
IPLV — Integrated Part-Load Values
wb — Wet Bulb

*Air Conditioning and Refrigeration Institute.

NOTES:
1. Rated in accordance with ARI Standards 360-89 and 270-89.
2. ARI ratings are net values, reflecting the effects of circulating fan heat.
3. Ratings are based on:

Cooling Standard: 80 F db, 67 F wb indoor entering-air temperature and 95 F db air entering outdoor unit.
IPLV Standard: 80 F db, 67 F wb indoor entering-air temperature and 80 F db outdoor entering-air temperature.

ARI HEATING CAPACITIES AND EFFICIENCIES — 48HJ015-025

UNIT 48	HEATING INPUT (Btuh) Stage 2/Stage 1*	OUTPUT CAPACITY (Btuh)	TEMPERATURE RISE (F)	AGA STEADY STATE EFFICIENCY (%)	MINIMUM HEATING CFM†
HJD015	230,000/172,000	186,300	15-45	81.0	3830
HJF015	300,000/230,000	243,000	30-60	81.0	3750
HJD017	275,000/206,000	222,750	15-45	81.0	4580
HJF017	360,000/275,000	291,600	20-50	81.0	5400
HJD025	275,000/206,000	222,750	15-45	81.0	4580
HJF025	360,000/275,000	291,600	20-50	81.0	5400

*All units are 2-stage heat.
†Minimum heating cfm must be maintained to ensure proper heating operation.

NOTE: Minimum allowable temperature of mixed air entering the heat exchanger during first stage heating is 45 F. There is no minimum mixed-air limitation during second-stage heating.

ARI capacity ratings (cont)

COOLING OPERATION AIR QUANTITY LIMITS

UNIT 50HJ	MINIMUM CFM	MAXIMUM CFM
015	3600	6,250
017	4500	7,500
025	6000	10,000

OUTDOOR AIR LOW TEMPERATURE OPERATING LIMITS

UNIT SIZE	TEMPERATURE LIMIT (F)		
	Standard Unit	Unit With Low Ambient Kit	Unit With Motormaster
015, 017	40	20	–20
025	40	25	–20

MULTIPLICATION FACTORS

HEATER RATING VOLTAGE	ACTUAL HEATER VOLTAGE										
	200	**208**	**230**	**240**	**380**	**440**	**460**	**480**	**550**	**575**	**600**
240	0.694	0.751	0.918	1.000	—	—	—	—	—	—	—
480	—	—	—	—	0.626	0.840	0.918	1.000	—	—	—
600	—	—	—	—	—	—	—	—	0.840	0.918	1.000

NOTE: The following equation converts kW of heat energy to Btuh: kW x 3.413 = Btuh.

EXAMPLE: 26.0 kW (at 240 v) heater on 208 v
= 26.0 (.751 mult factor)
= 19.5 kW capacity at 208 v.

ELECTRIC RESISTANCE HEATER DATA

UNIT 50HJ	HEATER kW Unit Voltages							HEATER STAGES	% HEAT PER STAGE	MAXIMUM STAGES*	MINIMUM Heating Cfm		HEATER AMPS						
	208	**230**	**240**	**460**	**480**	**575**	**600**				**Cfm**	**L/s**	**208**	**230**	**240**	**460**	**480**	**575**	**600**
015	14	17	19	14	15	—	—	1	100	1	3750	1770	39.3	43.4	45.3	17.2	17.9	—	—
	26	31	34	30	32	—	—	2	50/50	2			71.3	78.9	82.3	37.3	39.0	—	—
	42	52	56	50	55	37	40	2	33/67	3			117.0	129.4	135.0	63.3	66.1	37.0	38.6
017	26	31	34	30	32	—	—	2	50/50	2	3750	1770	71.3	78.8	82.3	37.3	39.0	—	—
	42	52	56	50	55	—	—	2	33/67	3			117.0	129.4	135.0	63.3	66.1	—	—
	56	69	75	73	80	—	—	2	50/50	4			155.9	172.4	179.9	92.0	96.0	—	—
025	26	31	34	30	32	—	—	2	50/50	2	5000	2360	71.3	78.8	82.3	37.3	39.0	—	—
	42	52	56	50	55	—	—	2	33/67	3			117.0	129.4	135.0	63.3	66.1	—	—
	56	69	75	73	80	—	—	2	50/50	4			155.9	172.4	179.9	92.0	96.0	—	—

*Maximum number of stages using accessory low-ambient kit or head pressure control device and low-ambient kit.

NOTE: Heaters are rated at 208, 240, 400, 480, and 575 v. Use multiplication factors table to determine kW at different voltages.

OUTDOOR SOUND POWER

48/50HJ	RATING (Bels)	A-WEIGHT (dB)	OCTAVE BANDS							
			63	125	250	500	1000	2000	4000	8000
015,017	8.8	87.6	90.8	88.7	86.4	84.3	83.5	78.4	75.6	66.8
025	9.4	94.4	99.7	93.0	93.7	91.8	89.7	85.9	80.7	74.7

LEGEND

Bels — Sound Levels (1 bel = 10 decibels)

INDOOR SOUND DATA (TOTAL UNIT)

UNIT 48/50HJ	SOUND RATING-BELS (60 Hz)	A-WEIGHTED (dB)	SOUND POWER (dB) Octave Bands							
			63	125	250	500	1000	2000	4000	8000
015	8.8	87.3	87.1	89.9	86.4	84.0	82.7	79.0	73.9	68.6
017	8.9	88.0	95.7	88.9	87.2	85.2	91.9	79.5	72.7	66.0
025	9.5	94.1	90.6	87.2	89.9	86.2	85.8	81.0	75.6	69.6

LEGEND

Bels — Sound Levels (1 bel = 10 decibels)

Physical data

PHYSICAL DATA — 48HJ UNITS

UNIT 48HJD/F		015			017			025		
		208/230	460	575	208/230	460	575	208	230/460	575
NOMINAL CAPACITY (tons)		12			15			20		
OPERATING WEIGHT (lb)										
Unit										
Al/Al*		1725			1800			1900		
Al/Cu*		1875			1950			2050		
Cu/Cu*		2005			2080			2180		
Economizer		110			110			110		
Roof Curb†		200			200			200		
MoistureMi$er Dehumidification Package		40			40			40		
COMPRESSOR										
Quantity...Model (Ckt 1, Ckt 2)		1...ZR72KC, 1...ZR57KC			1...ZR94KC, 1...ZR72KC			1...ZR125KC, 1...ZR108KC		
Number of Refrigerant Circuits		2			2			2		
Loading (% of full capacity)		0,56,100			0,60,100			0,60,100		
Crankcase Heater Watts		70			70			70		
Oil (oz) (Ckt 1, Ckt 2)		60,66			85,60			110,110		
REFRIGERANT TYPE		R-22								
Expansion Device		TXV								
Operating Charge (lb)										
Circuit 1**		20.7			19.5			18.5		
Circuit 2		11.9			13.45			13.3		
CONDENSER COIL		Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins								
Rows...Fins/in.		4...15			4...15			4...15		
Total Face Area (sq ft)		21.7			21.7			21.7		
CONDENSER FAN		Propeller Type								
Nominal Cfm		10,500			10,500			14,200		
Quantity...Diameter (in.)		3...22			3...22			2...30		
Motor Hp...Rpm		1/2...1050			1/2...1050			1...1075		
Watts Input (Total)		1100			1100			3400		
EVAPORATOR COIL		Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced or Copper Plate Fins, Face Split								
Rows...Fins/in.		4...15			4...15			4...15		
Total Face Area (sq ft)		17.5			17.5			17.5		
EVAPORATOR FAN		Centrifugal Type								
Quantity...Size (in.)		2...10 X 10			2...12 x 12			2...12 x 12		
Type Drive		Belt			Belt			Belt		
Nominal Cfm		5200			6000			8000		
Std Motor Hp		2.9	3.0		5			7.5		
Opt Motor Hp		3.7	N/A							
Motor Nominal Rpm		1725			1745			1745		
Std Maximum Continuous Bhp		3.13	3.38		6.13			9.47	10.33	9.47
Opt Maximum Continuous Bhp		4.38	N/A							
Motor Frame Size		56H			184T			213T		
Fan Rpm Range	Low-Medium Static	834-1064	1105-1321		873-1021			1002-1151		
	High Static	1161-1426	N/A		1025-1200			1193-1369		
Motor Bearing Type		Ball			Ball			Ball		
Maximum Allowable Rpm		1550			1550			1550		
Motor Pulley Pitch Dia.	Low-Medium Static	3.1/4.1	4.3/5.3		4.9/5.9			5.4/6.6		
	High Static	3.7/4.7	N/A		4.9/5.9			5.4/6.6		
Nominal Motor Shaft Diameter (in.)		7/8	7/8		1 1/8			1 3/8		
Fan Pulley Pitch Diameter (in.)	Low-Medium Static	6.0	6.4		9.4			9.4		
	High Static	5.2	N/A		8.0			7.9		
Nominal Fan Shaft Diameter (in.)		1 3/16	1 3/16		1 7/16			1 7/16		
Belt, Quantity...Type... Length (in.)	Low-Medium Static	1...BX...42	1...BX...45		1...BX...50			1...BX...54		
	High Static	1...BX...42	N/A		1...BX...48			1...BX...50		
Pulley Center Line Distance (in.)		13.5-15.5	13.5-15.5		13.3-14.8			14.6-15.4		
Speed Change per Full Turn of Movable Pulley Flange (Rpm)	Low-Medium Static	58	55		37			37		
	High Static	67	N/A		44			44		
Movable Pulley Maximum Full Turns From Closed Position		4††	4††		4††			4		
Factory Speed		3.5	3.5		3.5			3.5		
Factory Speed Setting (Rpm)	Low-Medium Static	978	1240		965			1095		
	High Static	1327	N/A		1134			1303		
FURNACE SECTION										
Rollout Switch Cutout Temp (F)‖		190			190			190		
Burner Orifice Diameter (in...drill size) Natural Gas		0.1285...30/ 0.136...29			0.1285...30/ 0.136...29			0.1285...30/ 0.136...29		
Thermostat Heat Anticipator Setting										
Stage 1 (amps)		0.98	0.8	0.98	0.98	0.8	0.98	0.98	0.8	0.98
Stage 2 (amps)		0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44
Gas Input (Btuh) Stage 1		172,000/230,000			206,000/275,000			206,000/275,000		
Stage 2		225,000/300,000			270,000/360,000			270,000/360,000		
Efficiency (Steady State) (%)		81			81			81		
Temperature Rise Range		15-45/30-60			15-45/20-50			15-45/20-50		
Manifold Pressure (in. wg)										
Natural Gas		3.3			3.3			3.3		
Gas Valve Quantity		1			1			1		
Gas Valve Pressure Range (Min-Max Allowable) (in. wg)		5.5-13.5			5.5-13.5			5.5-13.5		
(psig)		.235-.487			.235-.487			.235-.487		
Field Gas Connection Size (in.-FPT)		3/4			3/4			3/4		
HIGH-PRESSURE SWITCH (psig)										
Cutout		426								
Reset (Auto.)		320								
LOW-PRESSURE SWITCH (psig)										
Cutout		27								
Reset (Auto.)		44								
FREEZE PROTECTION THERMOSTAT (F)										
Opens		30 ± 5								
Closes		45 ± 5								
OUTDOOR-AIR INLET SCREENS		Cleanable								
Quantity...Size (in.)		2...20 x 25 x 1 1...20 x 20 x 1								
RETURN-AIR FILTERS		Throwaway								
Quantity...Size (in.)		4...20 x 20 x 2 4...16 x 20 x 2								

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper
TXV — Thermostatic Expansion Valve

*Evaporator coil fin material/condenser coil fin material.
†Weight of 14-in. roof curb.
**Circuit 1 uses the lower portion of condenser coil and lower portion of evaporator coils, and Circuit 2 uses the upper portion of both coils.
††Pulley has 6 turns. Due to belt and pulley, moveable pulley cannot be set to 0 to 1 1/2 turns open.
‖Rollout switch is manual reset.

PHYSICAL DATA — 50HJ UNITS

UNIT 50HJ		015			017			025		
UNIT VOLTAGE		208/230	460	575	208/230	460	575	208	230/460	575
NOMINAL CAPACITY (tons)		12			15			20		
OPERATING WEIGHT (lb)										
Unit										
Al/Al*		1575			1650			1750		
Al/Cu*		1725			1800			1900		
Cu/Cu*		1855			1930			2030		
Economizer		110			110			110		
Roof Curb†		200			200			200		
MoistureMi$er Dehumidification Package		40			40			40		
COMPRESSOR										
Quantity...Model (Ckt 1, Ckt 2)		1...ZR72KC, 1...ZR57KC			1...ZR94KC, 1...ZR72KC			1...ZR125KC, 1...ZR108KC		
Number of Refrigerant Circuits		2			2			2		
Loading (% of full capacity)		0,56,100			0,60,100			0,60,100		
Oil (oz) (Ckt 1, Ckt 2)		60, 66			85, 60			110, 110		
REFRIGERANT TYPE		R-22								
Expansion Device		TXV								
Operating Charge (lb)**										
Circuit 1		20.7			19.5			18.5		
Circuit 2		11.9			13.45			13.3		
CONDENSER COIL		Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced, Aluminum Pre-Coated, or Copper Plate Fins								
Rows...Fins/in.		4...15			4...15			4...15		
Total Face Area (sq ft)		21.7			21.7			21.7		
CONDENSER FAN		Propeller Type								
Nominal Cfm		10,500			10,500			14,200		
Quantity...Diameter (in.)		322			3...22			2...30		
Motor Hp...Rpm		1/2...1050			1/2...1050			1...1075		
Watts Input (Total)		1100			1100			3400		
EVAPORATOR COIL		Cross-Hatched 3/8-in. Copper Tubes, Aluminum Lanced or Copper Plate Fins, Face Split								
Rows...Fins/in.		4...15			4...15			4...15		
Total Face Area (sq ft)		17.5			17.5			17.5		
EVAPORATOR FAN		Centrifugal Type								
Quantity...Size (in.)		2...10 x 10			2...12 x 12			2...12 x 12		
Type Drive		Belt			Belt			Belt		
Nominal Cfm		5200			6000			8000		
Std Motor Hp		2.9	3.0		5			7.5		
Opt Motor Hp		3.7	N/A							
Motor Nominal Rpm		1725			1745			1745		
Std Maximum Continuous Bhp		3.13	3.38		6.13			9.47	10.33	9.47
Opt Maximum Continuous Bhp		4.38	N/A		N/A			N/A		
Motor Frame Size		56H			184T			213T		
Fan Rpm Range	**Low-Medium Static**	834-1064	1105-1321		873-1021			1002 -1151		
	High Static	1161-1426	N/A		1025-1200			1193-1369		
Motor Bearing Type		Ball			Ball			Ball		
Maximum Allowable Rpm		1,550			1,550			1,550		
Motor Pulley Pitch Dia.	**Low-Medium Static**	3.1/4.1	4.3/5.3		4.9/5.9			5.4/6.6		
	High Static	3.7/4.7	N/A		4.9/5.9			5.4/6.6		
Nominal Motor Shaft Diameter (in.)		7/8	7/8		1 1/8			1 3/8		
Fan Pulley Pitch Diameter (in.)	**Low-Medium Static**	6.0	6.4		9.4			9.4		
	High Static	5.2	N/A		8.0			7.9		
Nominal Fan Shaft Diameter (in.)		1 3/16	1 3/16		1 7/16			1 7/16		
Belt, Quantity...Type...Length (in.)	**Low-Medium Static**	1...BX...42	1...BX...45		1...BX...50			1...BX...54		
	High Static	1...BX...42	N/A		1...BX...48			1...BX...50		
Pulley Center Line Distance (in.)		13.5-15.5	13.5-15.5		13.3-14.8			14.6-15.4		
Speed Change per Full Turn of Movable Pulley Flange (Rpm)	**Low-Medium Static**	58	55		37			37		
	High Static	67	N/A		44			44		
Movable Pulley Maximum Full Turns From Closed Position		4††	4††		4††			4††		
Factory Speed		3.5	3.5		3.5			3.5		
Factory Speed Setting (Rpm)	**Low-Medium Static**	978	1240		965			1095		
	High Static	1327	N/A		1134			1303		
HIGH-PRESSURE SWITCH (psig)										
Cutout		426								
Reset (Auto.)		320								
LOW-PRESSURE SWITCH (psig)										
Cutout		27								
Reset (Auto.)		44								
FREEZE PROTECTION THERMOSTAT (F)										
Opens		30 ± 5								
Closes		45 ± 5								
OUTDOOR-AIR INLET SCREENS		Cleanable								
Quantity...Size (in.)		2...20 x 25 x 1 1...20 x 20 x 1								
RETURN-AIR FILTERS		Throwaway								
Quantity...Size (in.)		4...20 x 20 x 2 4...16 x 20 x 2								

LEGEND

Al — Aluminum
Bhp — Brake Horsepower
Cu — Copper
TXV — Thermostatic Expansion Valve

*Evaporator coil fin material/condenser coil fin material.
†Weight of 14-in. roof curb.
**Circuit 1 uses the lower portion of condenser coil and lower portion of evaporator coils, and Circuit 2 uses the upper portion of both coils.
††Due to belt and pulley style, pulley cannot be set from 0 to 1 1/2 turns open.

Physical data (cont)

OPERATING AND RIGGING WEIGHTS

UNIT	BASE UNIT OPERATING WEIGHTS*					
	015		017		025	
	lb	kg	lb	kg	lb	kg
48HJD/F	1725	782	1800	816	1900	862
50HJ	1575	714	1650	748	1750	794

*Base unit weight does not include electric heaters, copper coils, economizer, power exhaust, barometric relief or crating. See Options and Accessories table below for more information.

NOTE: For 015 and 017 unit sizes add 75 lb (34 kg) for domestic crating. For 025 unit sizes add 135 lb (61 kg). For export crating add 500 lb (227 kg).

OPTIONS AND ACCESSORIES
(Weight Adders)

OPTION/ ACCESSORY	OPTION/ACCESSORY WEIGHTS					
	48/50HJ015		48/50HJ017		48/50HJ025	
	lb	kg	lb	kg	lb	kg
Barometric Relief Damper	50	23	50	23	50	23
Power Exhaust	85	39	85	39	85	39
Electric Heater*	50	23	50	23	50	23
Economizer	110	50	110	50	110	50
Cu Condenser Coil	150	68	150	68	150	68
Cu Condenser and Evaporator Coils	280	127	280	127	280	127
Roof Curb (14-in. curb)	200	91	200	91	200	91
Horizontal Adapter Roof Curb (Preassembled)	250	113	250	113	250	113
Horizontal Adapter Roof Curb (Field-assembled)	343	156	343	156	343	156
Hail Guard	60	27	60	27	60	27
MoistureMi$er Dehumidification Package	40	18	40	18	40	18

LEGEND

Cu — Copper

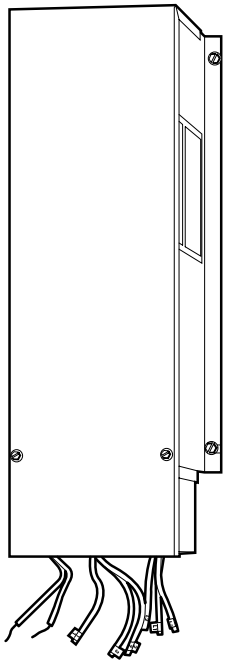
*Electric heaters are available for 50HJ units only.

Options and accessories

ITEM	OPTION*	ACCESSORY†
MoistureMi$er Dehumidification Package	X	
Apollo Direct Digital Communicating Controls	X	
Service Options (sold separately) 115 v Outlet Non-Fused Disconnect Hinged Access Panels	 X X X	
Integrated Economizer	X	X
Electric Heat (50HJ Only)**	X	
Enviro-Shield™ Condenser Coil Options	X	
Hail Guard Condenser Coil Grille		X
Alternate Drive	X	
Hail Guard		X
Double Wall Construction	X	
UVC Lamps	X	X
Novar Controls	X	
Johnson METYSES Controls	X	
Stainless Steel Condensate Pan	X	
Service Valves	X	
Stainless Steel Heat Exchangers	X	
LP (Liquid Propane) Conversion Kit (48HJ Only)		X
Electronic Programmable Thermostat		X
25% Open Two-Position Damper		X
Barometric Relief Damper**		X
Roof Curbs		X
Horizontal Adapter Curb		X
Thermostats and Subbases		X
Power Exhaust**		X
Low-Ambient Kit		X
Winter Start Time-Delay Relay		X
Motormaster® Head Pressure Control (015,017) (Speed Control)		X
Motormaster III Head Pressure Control (025) (Speed Control)		X
Time Guard® II Control Circuit		X
Accusensor™ III Enthalpy Sensor		X
Hydronic Glycol Coil (50HJ Only)		X

*Factory-installed.
†Field-installed.
**Not available with horizontal adapter curb.

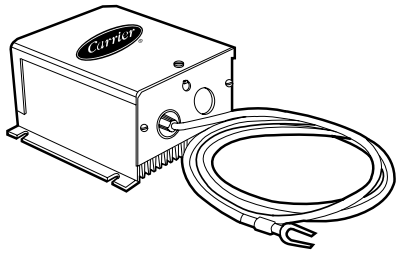
NOTE: Refer to 48/50HJ price pages or contact your local representative for accessory and option package information.



MOTORMASTER III CONTROL
(025)

HEAD PRESSURE CONTROL

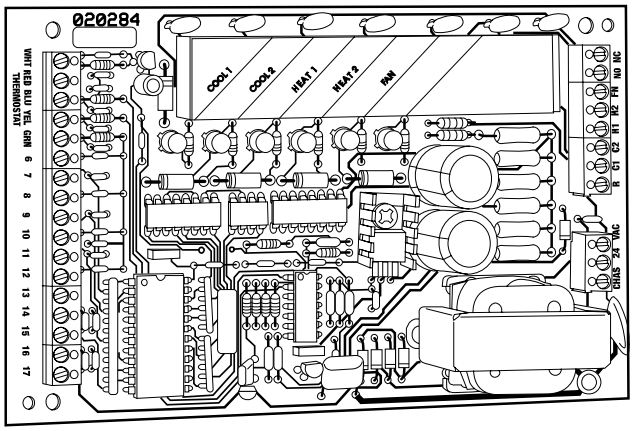
The 48/50HJ standard units are designed to operate in cooling at outdoor temperatures down to 40 F (4.4 C). With accessory Motormaster control (015,017) (condenser-fan speed modulation), or Motormaster III control (025) (condenser fan speed modulation) units can operate at outdoor temperatures down to –20 F (–28.9 C). The head pressure controls, which mount in the condenser section, control the condenser-fan motor to maintain correct condensing temperature. Refer to Price pages or contact your local Carrier representative for appropriate accessory combinations for desired outdoor ambient temperature operation.



MOTORMASTER CONTROL
(015,017)

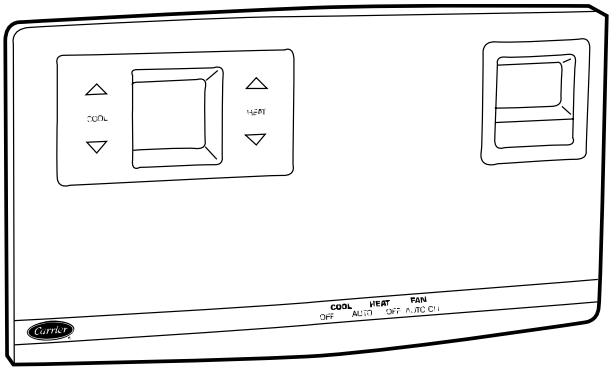
Options and accessories (cont)

FACTORY-INSTALLED APOLLO COMMUNICATING CONTROLS



The Apollo direct digital controls are designed exclusively by Carrier, and are used to actively monitor and control all modes of operation as well as to monitor evaporator-fan status, filter status, supply-air temperature, outdoor-air temperature, and indoor-air quality. They are designed to work in conjunction with Carrier TEMP and VVT® (Variable Volume/Variable Temperature) system thermostats.

ELECTRONIC PROGRAMMABLE THERMOSTAT

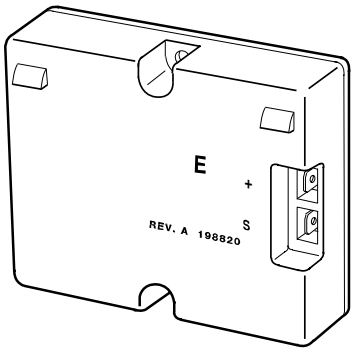


Carrier's electronic programmable thermostat provides efficient temperature control by allowing you to program heating and cooling setbacks and set ups with provisions for weekends and holidays. Accessory remote sensing package is also available to provide tamperproof control in high traffic spaces. Used in conjunction with factory-installed Apollo control, this thermostat provides a 5-minute recycle timer between modes of operation for short-cycle protection.

TIME GUARD® II CONTROL

Time Guard II Control automatically prevents compressor from restarting for at least 5 minutes after a shutdown. Accessory prevents short cycling of compressor if thermostat is changed rapidly. Time Guard II control mounts in the control compartment of unit.

ACCUSENSOR™ III (Enthalpy and Differential Enthalpy Control)

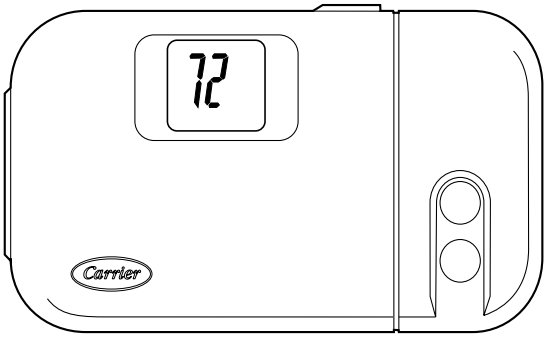


Accusensor economizer controls help provide efficient, economical economizer operation. The unit economizer provides the decision-making function internally, and requires one Accusensor III sensor for solid-state enthalpy sensing. A second Accusensor III sensor provides information for comparison of outdoor temperature and humidity to return-air temperature and humidity and determines the most economical mixture of air (purchased in addition to first solid-state enthalpy sensor for differential enthalpy sensing for all units).

LIQUID PROPANE (LP) CONVERSION KITS (48HJ Units Only)

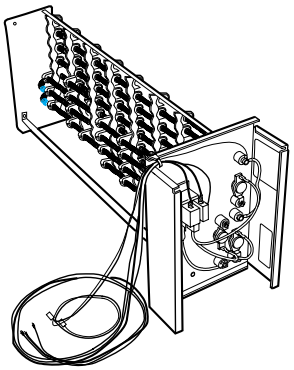
The LP conversion kit allows the unit to utilize a liquid propane fuel supply in areas where natural gas is unavailable, and permits the unit to be converted from natural gas to LP gas use. The kit contains the orifices required for LP operation. There is a single kit for both 48HJD and 48HJF units (spud change only).

CARRIER COMMERCIAL THERMOSTAT



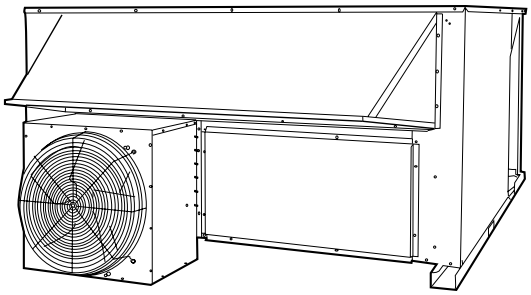
Designed specifically for use with Carrier commercial systems, this Carrier programmable thermostat features LED occupied/unoccupied displays and setback mode which can override continuous fan operation.

ELECTRIC HEATERS (50HJ Units Only)



Electric heaters (and single point kits) are available in a wide range of capacities for factory or field installation.

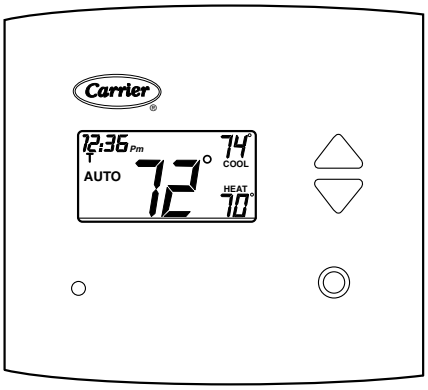
BAROMETRIC RELIEF/POWER EXHAUST



When used with accessory/optional economizer, the barometric relief or power exhaust accessory helps to relieve building overpressurization.

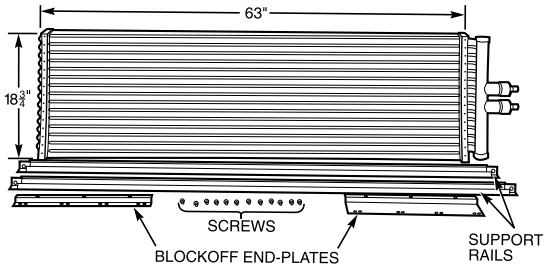
NOTE: This is not available to be installed on a unit with horizontal supply adapter curb. However, the accessory may be installed in the return ductwork.

CARRIER DEBONAIR® THERMOSTAT



Carrier's Debonair line of commercial programmable thermostats are wall-mounted, low-voltage thermostats which maintain room temperature by controlling operation of an HVAC (Heating, Ventilation, and Air-Conditioning) system. Separate heating and cooling set points and auto-changeover capability allow occupied and unoccupied programming for energy savings.

GLYCOL COIL (50HJ Units Only)



Glycol coil is intended for add-on type applications or new work where a boiler system is available. Glycol coil and electric heat cannot be installed together.

ENVIRO-SHIELD™ CONDENSER COIL OPTIONS

Condenser coil options are available to match coil construction to site conditions for the best corrosion durability. Pre-coated coils provide protections in mild coastal environments. All copper coils are best suited for moderate coastal applications, while post-coated coils provide superior protection in severe coastal and industrial applications.

CONDENSER COIL PROTECTION APPLICATIONS

DESCRIPTION (Enviro-Shield Option)	ENVIRONMENT*					
	Standard, Non-Corrosive	Mild Coastal	Moderate Coastal	Severe Coastal	Industrial	Combined Coastal and Industrial
Standard, Al/Cu	X					
Pre-Coated Al/Cu		X				
Cu/Cu			X			
E-Coated Al/Cu					X	
E-Coated Cu/Cu				X		X

LEGEND

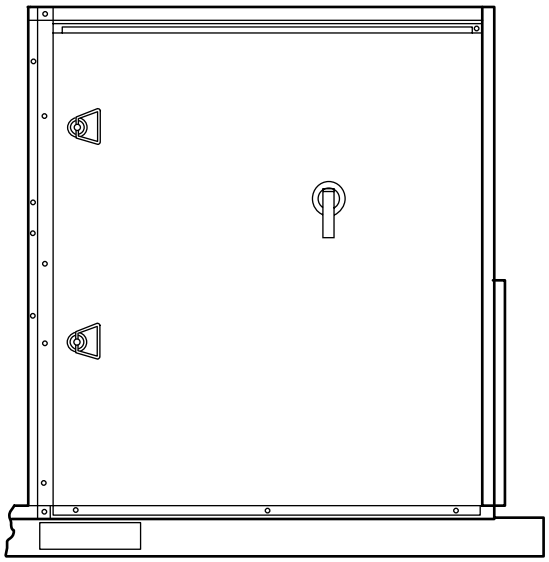
Al/Cu — Aluminum Fin with Copper Tube Coil
Cu/Cu — Copper Fin with Copper Tube Coil
Enviro-Shield — Family of Coil Protection Options
E-Coated — Extremely flexible and durable epoxy coating uniformly applied to the coil surfaces.
Pre-Coated — Epoxy Coating Applied to Fin Stock Material

*See "Selection Guide: Environmental Corrosion Protection'' Catalog No. 811-217 for more information.

Options and accessories (cont)

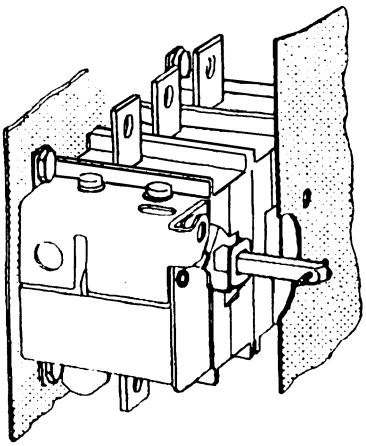
SERVICE OPTIONS

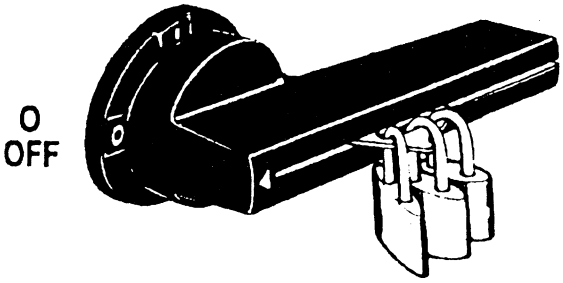
HINGED ACCESS PANELS



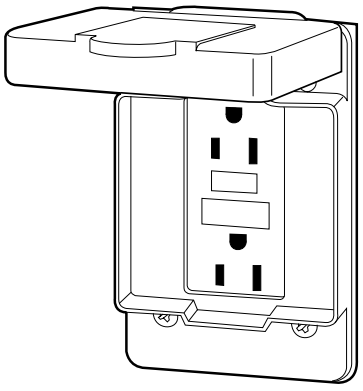
Factory-installed, internally-mounted, NEC (National Electrical Code) and UL (Underwriters' Laboratories) approved non-fused switch provides unit power shutoff with disconnect lockout protection capability. The control box access door is interlocked with the non-fused disconnect. The non-fused disconnect must be in the OFF position to open this door. The switch is accessible from outside the unit.

UNIT MOUNTED DISCONNECT



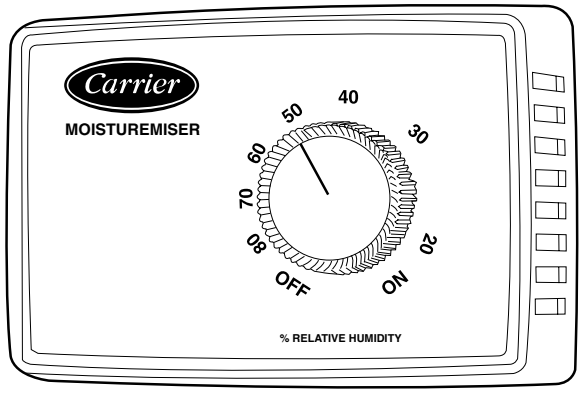


CONVENIENCE OUTLET



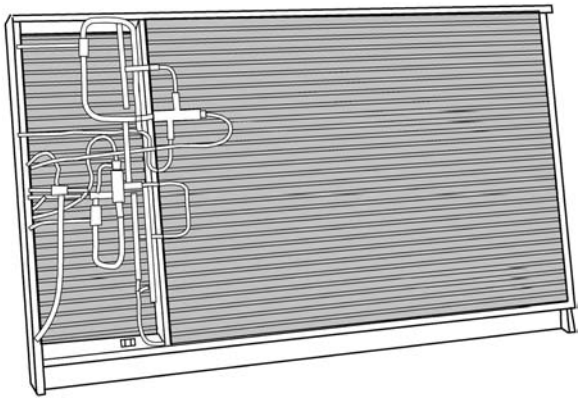
Factory-installed, internally mounted and externally accessible 115-v female receptacle. Includes 15-amp GFI (Ground Fault Interrupter) receptacle with independent fuse protection. Voltage required to operate convenience outlet is provided by a field-installed transformer.

HUMIDISTAT



Field-installed, wall-mounted humidistat is used to control operation of the MoistureMi$er dehumidification package. The humidistat controls the occupied space humidity at a user-selected setting between 20% and 80% relative humidity.

MOISTUREMI$ER DEHUMIDIFICATION PACKAGE

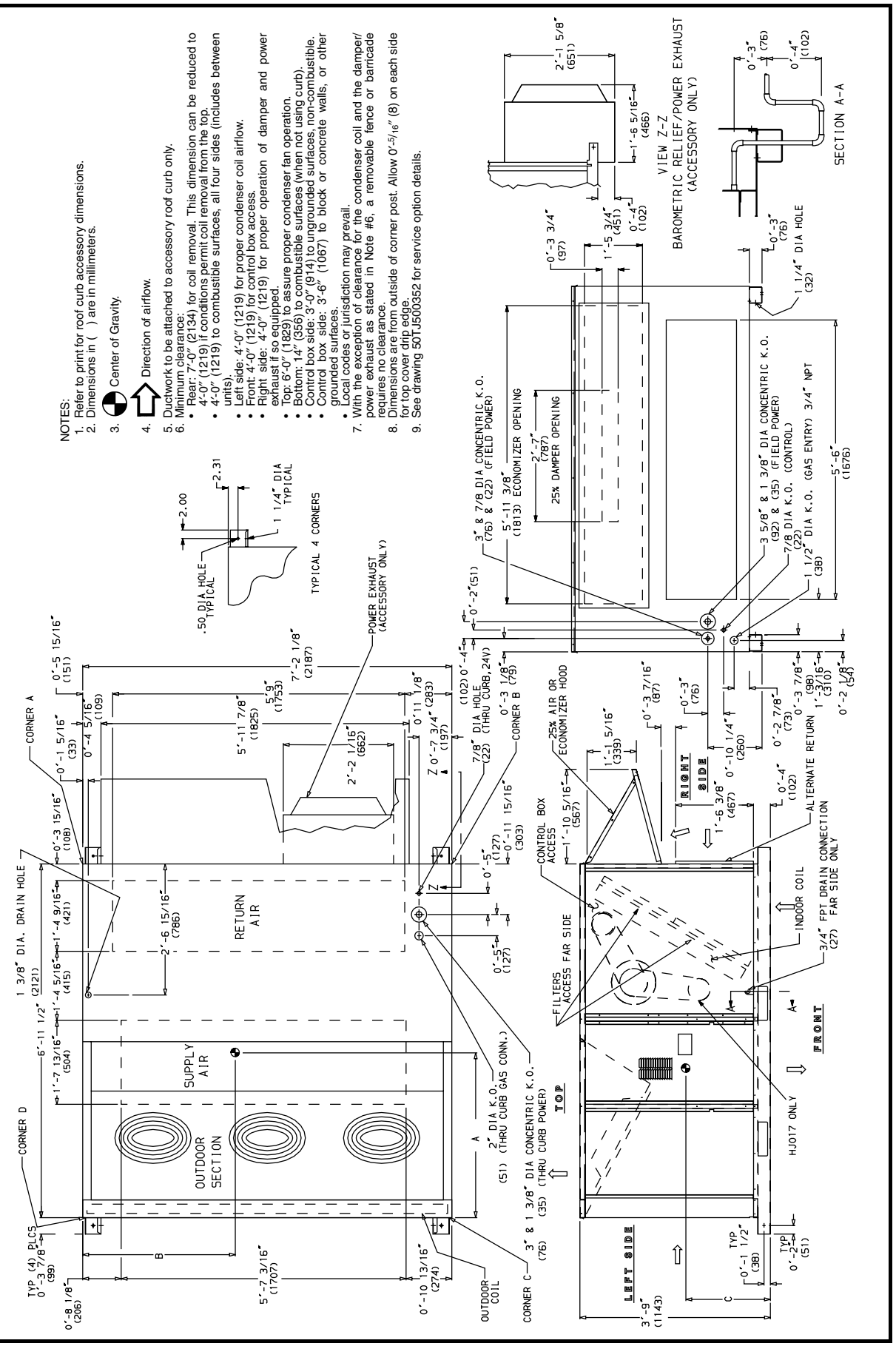


The MoistureMi$er dehumidification package is a factory-installed option that provides increased dehumidification by cooling the hot liquid refrigerant leaving the condenser coil. The MoistureMi$er package consists of a subcooling coil located on the leaving-air side of the evaporator coil. The location of this coil in the indoor-air stream enhances the latent capacity of the 48/50HJ units by as much as 40%. The MoistureMi$er package includes the subcooling coil and low-pressure switches and operation can be controlled by a field-installed, wall-mounted humidistat or thermidistat.

Base unit dimensions — 48HJ015,017

UNIT	STD UNIT WEIGHT		ECONOMIZER WEIGHT		CORNER A		CORNER B		CORNER C		CORNER D		DIM A		DIM B		DIM C	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	ft-in.	mm	ft-in.	mm	ft-in.	mm
48HJD, HJF015	1725	782	110	50	407	185	375	170	383	174	410	186	3-3	991	3- 5	1051	1-10	559
48HJD, HJF017	1800	816	110	50	417	189	399	181	481	218	503	228	3- 2	961	3-6	1070	1-10	559

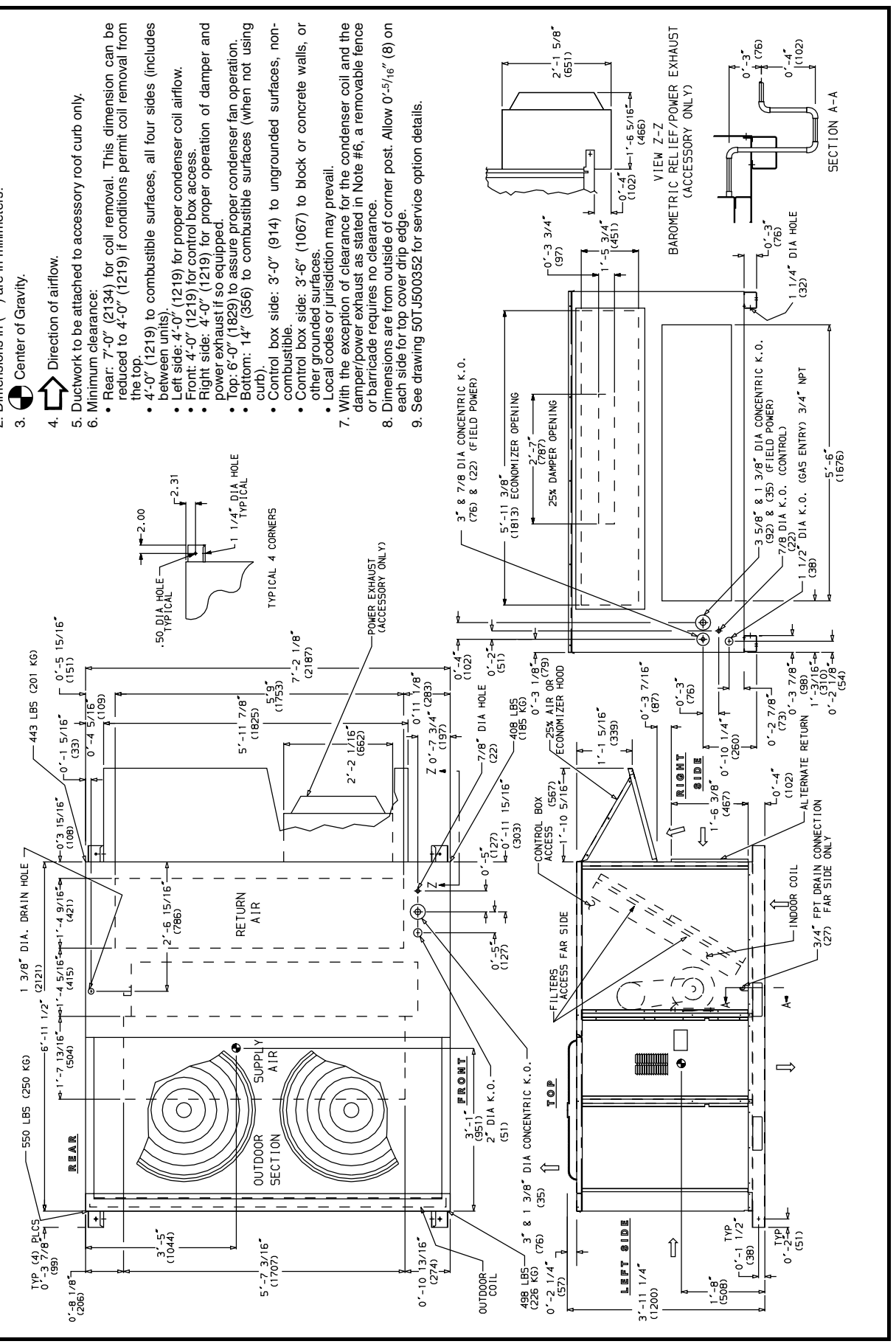
NOTES:
1. Refer to print for roof curb accessory dimensions.
2. Dimensions in ( ) are in millimeters.
3. Center of Gravity.
4. Direction of airflow.
5. Ductwork to be attached to accessory roof curb only.
6. Minimum clearance:
   - Rear: 7'-0" (2134) for coil removal. This dimension can be reduced to 4'-0" (1219) if conditions permit coil removal from the top.
   - 4'-0" (1219) to combustible surfaces, all four sides (includes between units).
   - Left side: 4'-0" (1219) for proper condenser coil airflow.
   - Front: 4'-0" (1219) for control box access.
   - Right side: 4'-0" (1219) for proper operation of damper and power exhaust if so equipped.
   - Top: 6'-0" (1829) to assure proper condenser fan operation.
   - Bottom: 14" (356) to combustible surfaces (when not using curb).
   - Control box side: 3'-0" (914) to ungrounded surfaces, non-combustible.
   - Control box side: 3'-6" (1067) to block or concrete walls, or other grounded surfaces.
   - Local codes or jurisdiction may prevail.
7. With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #6, a removable fence or barricade requires no clearance.
8. Dimensions are from outside of corner post. Allow 0'-5/16" (8) on each side for top cover drip edge.
9. See drawing 50TJ500352 for service option details.



Base unit dimensions — 48HJ025

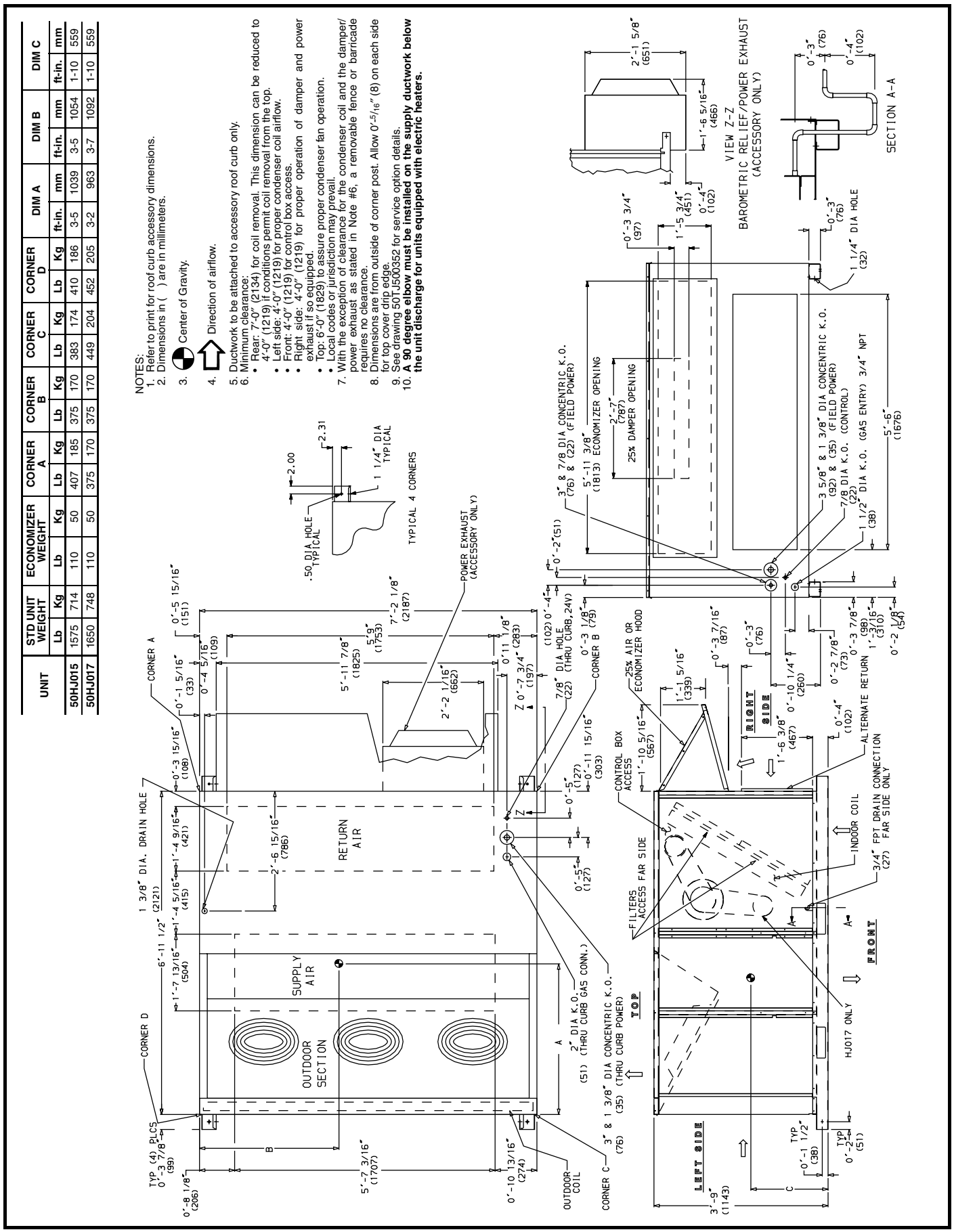
UNIT	STD. UNIT WEIGHT	ECONOMIZER WEIGHT
48HJD/F025	1900 lbs (862 kg)	110 lbs (50 kg)

NOTES:
1. Refer to print for roof curb accessory dimensions.
2. Dimensions in ( ) are in millimeters.
3. ◒ Center of Gravity.
4. ⇧ Direction of airflow.
5. Ductwork to be attached to accessory roof curb only.
6. Minimum clearance:
   - Rear: 7'-0" (2134) for coil removal. This dimension can be reduced to 4'-0" (1219) if conditions permit coil removal from the top.
   - 4'-0" (1219) to combustible surfaces, all four sides (includes between units).
   - Left side: 4'-0" (1219) for proper condenser coil airflow.
   - Front: 4'-0" (1219) for control box access.
   - Right side: 4'-0" (1219) for proper operation of damper and power exhaust if so equipped.
   - Top: 6'-0" (1829) to assure proper condenser fan operation.
   - Bottom: 14" (356) to combustible surfaces (when not using curb).
   - Control box side: 3'-0" (914) to ungrounded surfaces, non-combustible.
   - Control box side: 3'-6" (1067) to block or concrete walls, or other grounded surfaces.
   - Local codes or jurisdiction may prevail.
7. With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #6, a removable fence or barricade requires no clearance.
8. Dimensions are from outside of corner post. Allow 0'-5/16" (8) on each side for top cover drip edge.
9. See drawing 50TJ500352 for service option details.



Base unit dimensions — 50HJ015,017

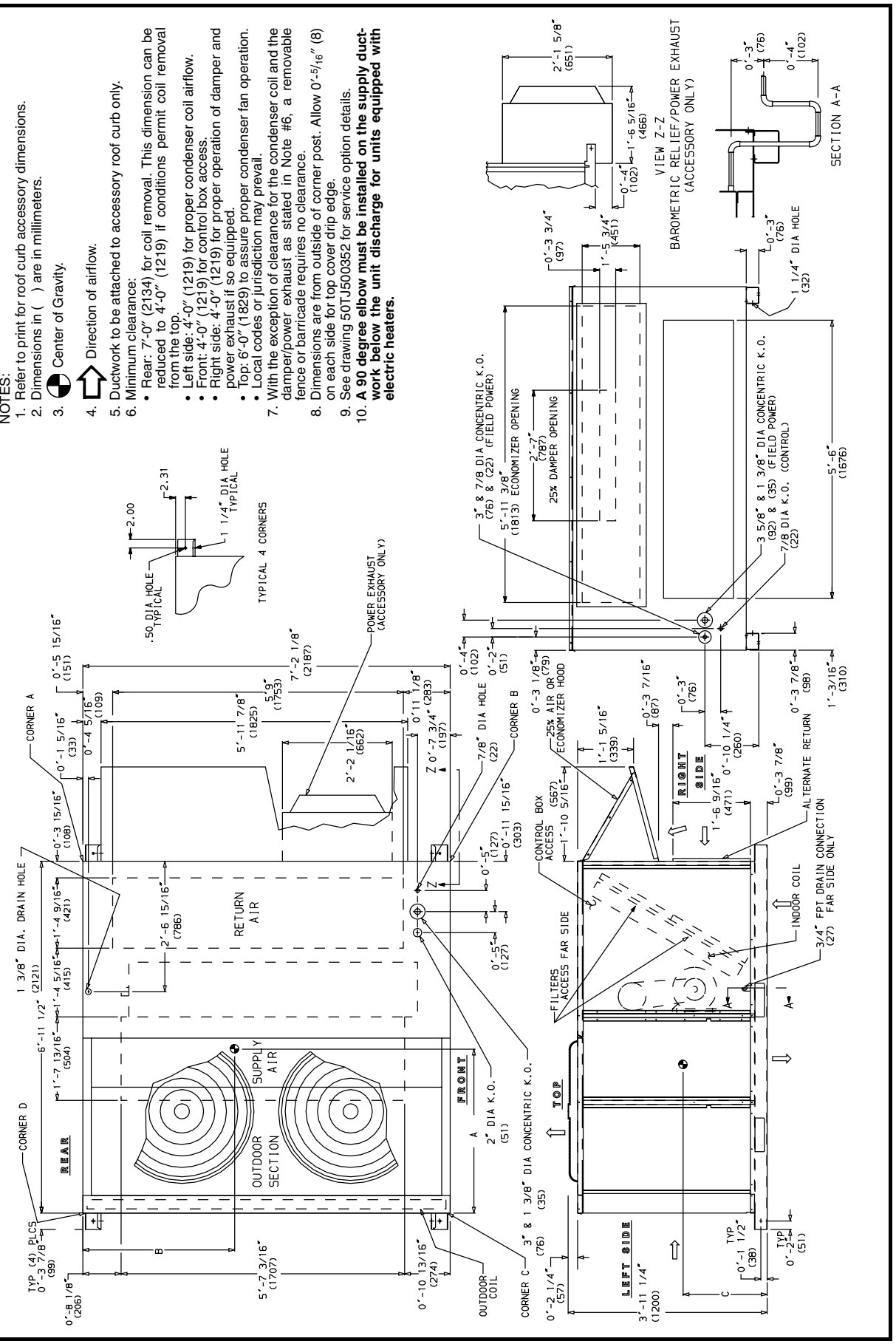
UNIT	STD UNIT WEIGHT		ECONOMIZER WEIGHT		CORNER A		CORNER B		CORNER C		CORNER D		DIM A		DIM B		DIM C	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	ft-in.	mm	ft-in.	mm	ft-in.	mm
50HJ015	1575	714	110	50	407	185	375	170	383	174	410	186	3-5	1039	3-5	1054	1-10	559
50HJ017	1650	748	110	50	375	170	375	170	449	204	452	205	3-2	963	3-7	1092	1-10	559



Base unit dimensions — 50HJ025

UNIT	STD UNIT WEIGHT		ECONOMIZER WEIGHT		CORNER A		CORNER B		CORNER C		CORNER D		DIM A		DIM B		DIM C	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg	ft-in.	mm	ft-in.	mm	ft-in.	mm
50HJ025	1750	794	110	50	420	191	395	179	448	203	486	221	3-3	988	3-5	1054	1-8	508

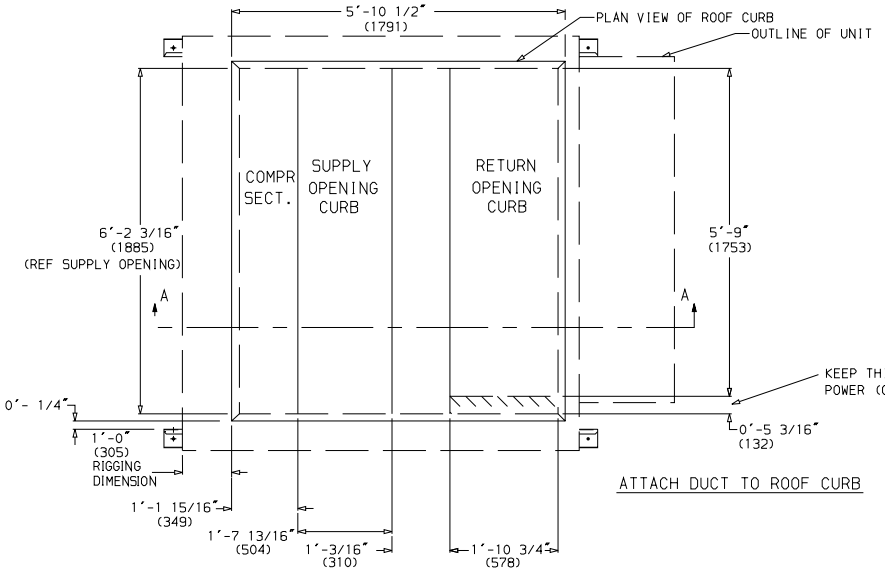
NOTES:
1. Refer to print for roof curb accessory dimensions.
2. Dimensions in ( ) are in millimeters.
3. Center of Gravity.
4. Direction of airflow.
5. Ductwork to be attached to accessory roof curb only.
6. Minimum clearance:
   - Rear: 7'-0" (2134) for coil removal. This dimension can be reduced to 4'-0" (1219) if conditions permit coil removal from the top.
   - Left side: 4'-0" (1219) for proper condenser coil airflow.
   - Front: 4'-0" (1219) for control box access.
   - Right side: 4'-0" (1219) for proper operation of damper and power exhaust if so equipped.
   - Top: 6'-0" (1829) to assure proper condenser fan operation.
   - Local codes or jurisdiction may prevail.
7. With the exception of clearance for the condenser coil and the damper/power exhaust as stated in Note #6, a removable fence or barricade requires no clearance.
8. Dimensions are from outside of corner post. Allow 0'-5/16" (8) on each side for top cover drip edge.
9. See drawing 50TJ500352 for service option details.
10. **A 90 degree elbow must be installed on the supply duct-work below the unit discharge for units equipped with electric heaters.**



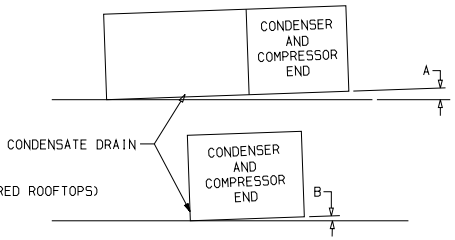
PKG. NO. REF.	CURB HEIGHT	DESCRIPTION
CRRFCURB010A00	1′–2″ (305)	Standard Curb 14″ High
CRRFCURB011A00	2′-0″ (610)	Standard Curb for Units Requiring High Installation
CRRFCURB012A00	2′-0″ (610)	Side Supply and Return Curb for High Installation

NOTES:
1. Roof curb accessory is shipped disassembled.
2. Insulated panels: 1″ thick neoprene coated 1½ lb density.
3. Dimensions in ( ) are in millimeters.
4. ⇨ Direction of airflow.
5. Roof curb: 16 ga. (VA03-56) stl.
6. **A 90 degree elbow must be installed on the supply ductwork below the unit discharge for units equipped with electric heaters.**

NOTE: To prevent the hazard of stagnant water build-up in the drain pan of the indoor section, unit can only be pitched as shown.



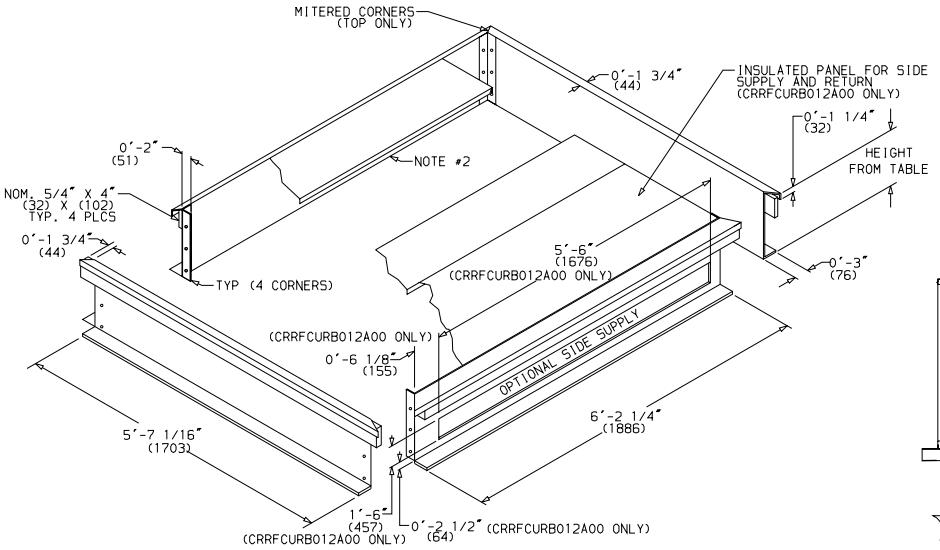
ATTACH DUCT TO ROOF CURB

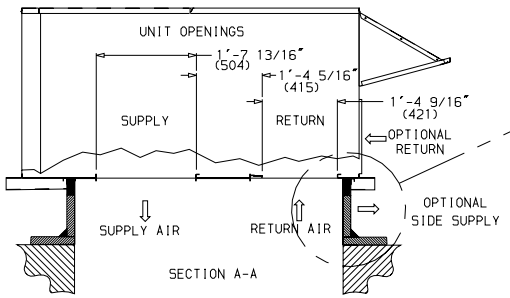


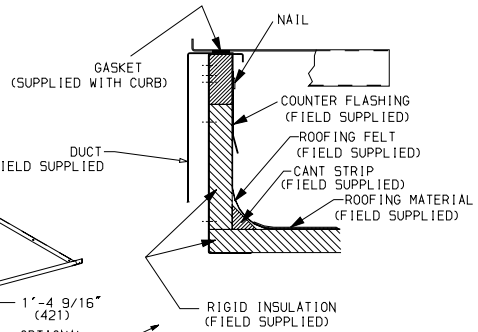
DIMENSIONS* (degrees and inches)

UNIT	A		B	
	Deg.	in.	Deg.	in.
ALL	.28	.45	.28	.43

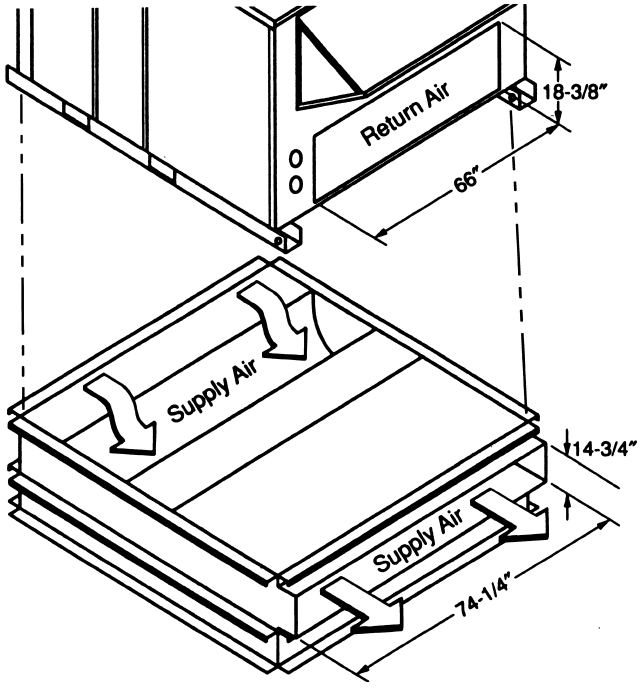
UNIT LEVELING TOLERANCES
*From edge of unit to horizontal.







HORIZONTAL SUPPLY/RETURN ADAPTER INSTALLATION

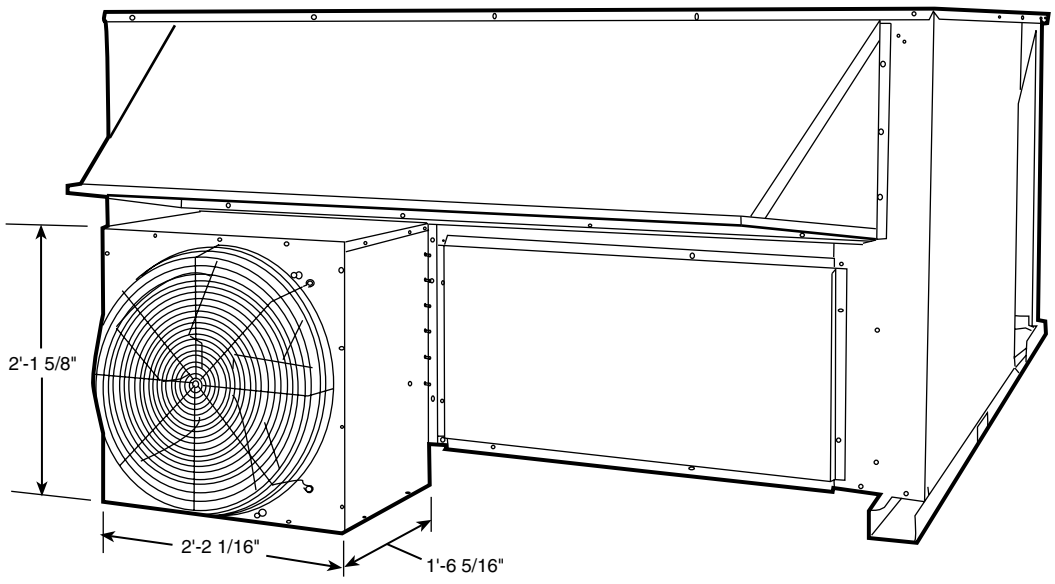


NOTE: CRRFCURB013A00 is a fully factory preassembled horizontal adapter and includes an insulated high static regain transition duct which substantially improves fan static performance.

The Barometric Relief Damper and Power Exhaust accessories are not available with the horizontal adapter.

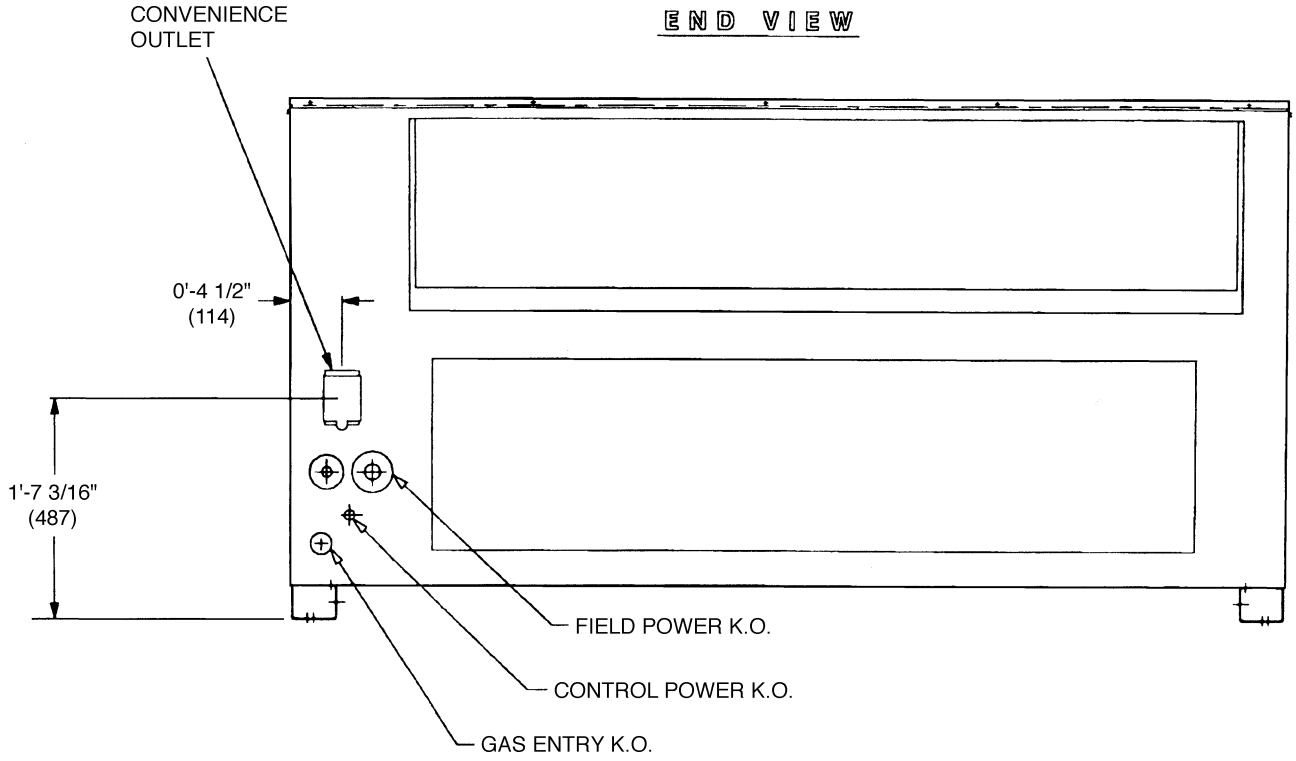
ACCESSORY PACKAGE NO.	CURB HEIGHT	DESCRIPTION
CRRFCURB013A00	1′-11″ (584)	Pre-Assembled, High Static, Horizontal Adapter Roof Curb

BAROMETRIC RELIEF/POWER EXHAUST

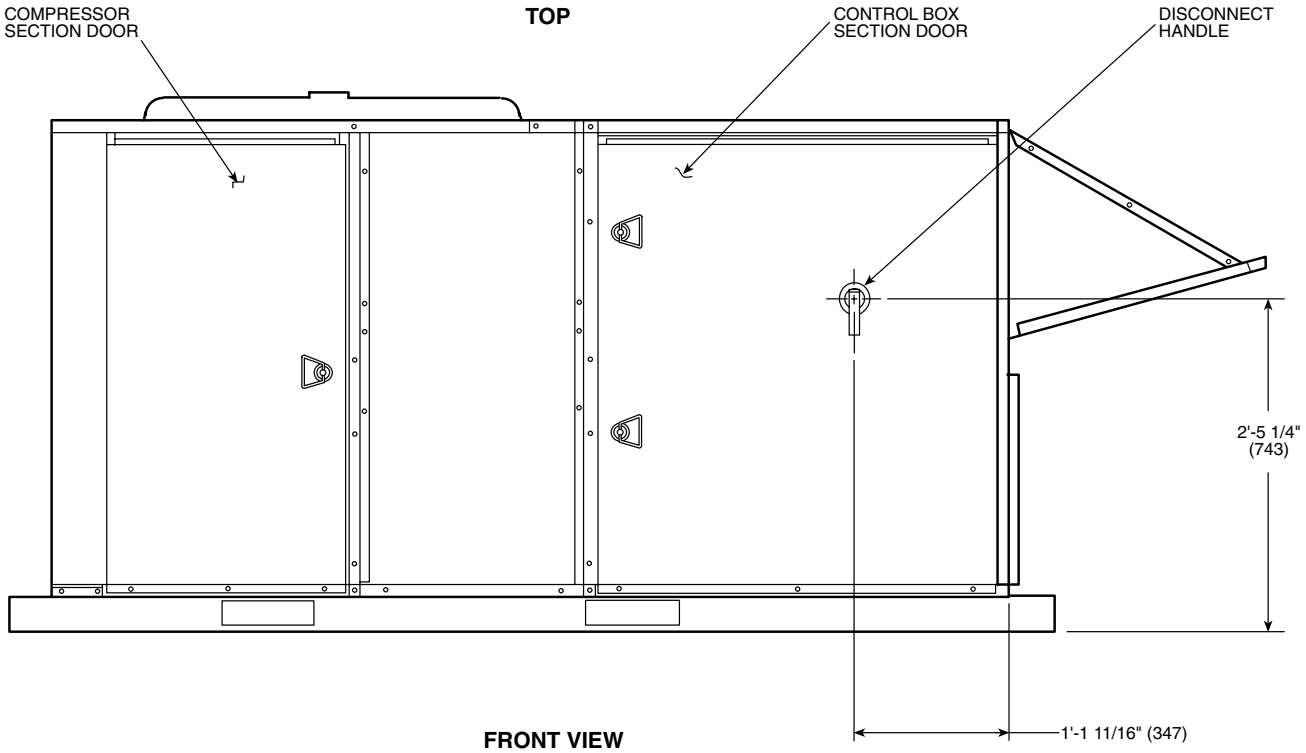


Accessory dimensions (cont)

FACTORY-INSTALLED CONVENIENCE OUTLET



FACTORY-INSTALLED NON-FUSED DISCONNECT



Selection procedure (with 48HJ025 example)

I. Determine cooling and heating requirements at design conditions.

Given:

Required Gross Cooling Capacity (TC) . . . . . .216,000 Btuh

Gross Sensible Heat Capacity (SHC) . . . . . .168,000 Btuh

Required Heating Capacity . . . . . .190,000 Btuh

Condenser Entering Air Temperature . . . . . 95 F Summer

Indoor Air Temperature . . . . . .80 F edb, 67 F ewb

Evaporator Air Quantity. . . . . 8,000 cfm

External Static Pressure . . . . . .1.30 in. wg

Electrical Characteristics (V-Ph-Hz) 460-3-60

Optional economizer required.

II. Select unit based on required cooling capacity.

Enter Cooling Capacities table for 48HJ025 at condenser entering temperature of 95 F, evaporator air quantity of 8,000 cfm, and indoor air temperature of 67 F. The 48HJ025 unit will provide a total cooling capacity of 252,000 Btuh and a SHC of 183,000 Btuh. For evaporator air temperatures other than 80 F, calculate SHC correction using formula in notes under cooling capacity tables.

Unit meets design conditions for TC and SHC.

NOTE: Unit ratings are gross capacities and do not include the effect of indoor fan motor heat. To calculate net capacities, see Step V.

III. Select heating capacity of unit to provide design condition requirement.

In Heating Capacities and Efficiencies table, note that 48HJD025 (low heat) unit will provide 218,700 Btuh with an input of 270,000 Btuh.

IV. Determine fan speed and power requirements at design conditions.

Before entering the Fan Performance tables, calculate the total static pressure required based on unit components. Tabulated fan performance includes filters and wet evaporator coil. Refer to Accessory/FIOP Static Pressure — 48HJ015-025 Units table for added pressure drops.

Calculate pressure drop:

Design External Static Pressure 1.30

Economizer Static Pressure + 0.10

1.40 in. wg (ESP)

Enter Fan Performance tables for 48HJD025 (low heat units) at 8,000 cfm and 1.40 in. wg. The rpm is 1359 and the Bhp is 7.08. The factory-installed 7.5 hp motor and alternate high-static drive are sufficient for this operation.

V. Determine net cooling capacities.

Cooling capacities are gross capacities and do not include indoor (evaporator) fan motor (IFM) heat. To determine input power to the motor, enter the Fan Performance tables for 48HJD025 (low heat units) at 8,000 cfm and 1.40 in. wg. Input watts to the motor are 5970.

Determine net cooling capacity and net sensible cooling capacity using the following formulas:

IFM Heat = Input Watts x 3.412 Btuh/Watt
= 5970 x 3.412
= 20,370 Btuh

Net Capacity = Gross Capacity – IFM Heat
= 252,000 – 20,370
= 231,630 Btuh

Net Sensible Cap. = Gross Sensible Cap. – IFM Heat
= 183,000 – 20,370
= 162,630 Btuh

The calculations show that a 48HJD025 unit is the correct selection for the given conditions.

VI. Select the unit that corresponds to power source available.

The electrical data table shows that the 460-3-60 unit is available.

Selection procedure (with 50HJ017 example)

I. Determine cooling and heating requirements at design conditions.

Given:

Required Gross Cooling Capacity (TC) . . . . . .168,000 Btuh

Gross Sensible Heat Capacity (SHC) . . . . . .121,000 Btuh

Required Heating Capacity . . . . . .110,000 Btuh

Condenser Entering Air Temperature 95F

Indoor Air Temperature . . . . . .80 F edb, 67 F ewb

Evaporator Air Quantity. . . . . 6,000 cfm

External Static Pressure . . . . . .1.45 in. wg

Electrical Characteristics (V-Ph-Hz) 230-3-60

II. Select unit based on required cooling capacity.

Enter Cooling Capacities table for 50HJ017 at condenser entering temperature of 95 F, evaporator air quantity of 6,000 cfm, and indoor air temperature of 67 F. The 50HJ017 unit will provide a total cooling capacity of 190,000 Btuh and a SHC of 136,000 Btuh. For evaporator air temperatures other than 80 F, calculate SHC correction using formula in notes under cooling capacity tables.

Unit meets design conditions for TC and SHC.

NOTE: Unit ratings are gross capacities and do not include the effect of indoor fan motor heat. To calculate net capacities, see Step V.

III. Select electric heat.

Heating load required is 110,000 Btuh.

$$\frac{110{,}000 \text{ Btuh}}{3.412 \text{ Btu/W}} = 32{,}239 \text{ Watts Required}$$

$$= 32.2 \text{ kW required}$$

Enter the Electric Resistance Heater Data table, on page 6, for the 50HJ017 unit at 230-3-60. The 56 kW (52 kW at 230 v) heater most closely satisfies the heat required.

IV. Determine fan speed and power requirements at design conditions.

Before entering the Fan Performance tables, calculate the total static pressure required based on unit components. Tabulated fan performance includes filters and wet evaporator coil. Refer to Accessory/FIOP Static Pressure table for added pressure drops.

Enter the Accessory/FIOP Static Pressure — 50HJ015-025 Units table at the selected unit size, cfm, and kW heater size to determine heater pressure drop.

Calculate pressure drop:

Design External Static Pressure 1.45

56 kW Heater Static Pressure + 0.12

1.57 in. wg (ESP)

Enter Fan Performance tables for 50HJ017 at 6,000 cfm and 1.57 in. wg. The rpm is 1184 and the Bhp is 4.43 (interpolation required). The factory-installed 5 hp motor and alternate high-static drive are sufficient for this operation.

V. Determine net cooling capacities.

Cooling capacities are gross capacities and do not include indoor (evaporator) fan motor (IFM) heat. To determine input power to the motor, enter the Fan Performance tables for 50HJ017 at 6,000 cfm and 1.57 in. wg. Input watts to the motor are 3772 (interpolation required).

Determine net cooling capacity and net sensible cooling capacity using the following formulas:

IFM Heat = Input Watts x 3.412 Btuh/Watt
= 3772 x 3.412
= 12,870 Btuh

Net Capacity = Gross Capacity – IFM Heat
= 190,000 – 12,870
= 177,130 Btuh

Net Sensible Cap. = Gross Sensible Cap. – IFM Heat
= 136,000 – 12,870
= 123,130 Btuh

The calculations show that a 50HJ017 unit with the 56 kW heater is the correct selection for the given conditions.

VI. Select the unit that corresponds to power source available.

The electrical data table shows that the 230-3-60 unit is available.

Performance data

COOLING CAPACITIES

48/50HJ015 (12 TONS)

Temp (F) Air Entering (Edb)		Evaporator Air Quantity — Cfm/BF														
		3600/0.03			4375/0.04			5000/0.05045			5625/0.06			6250/0.07		
		Evaporator Air — Ewb (F)														
		62	67	72	62	67	72	62	67	72	62	67	72	62	67	72
75	TC	134	145	153	137	148	156	141	149	156	144	151	157	147	152	157
	SHC	111	93	72	124	103	77	130	109	77	134	114	79	137	119	79
	kW	7.9	8.1	8.2	8.0	8.2	8.3	8.1	8.2	8.3	8.1	8.2	8.3	8.2	8.2	8.3
85	TC	130	140	147	133	142	149	136	144	149	139	145	150	141	146	150
	SHC	109	90	68	120	97	72	127	106	73	130	110	76	132	112	76
	kW	8.9	9.1	9.2	8.9	9.1	9.2	9.0	9.1	9.2	9.1	9.2	9.2	9.1	9.2	9.2
95	TC	125	134	141	128	136	142	131	138	142	133	138	142	136	139	142
	SHC	106	87	66	117	94	69	122	99	71	124	104	72	127	108	73
	kW	9.9	10.1	10.2	10.0	10.1	10.2	10.1	10.2	10.2	10.1	10.2	10.2	10.2	10.2	10.2
105	TC	120	129	134	123	130	134	126	131	134	128	132	135	129	132	135
	SHC	104	85	63	114	91	67	117	95	67	119	100	68	120	105	70
	kW	11.1	11.2	11.3	11.1	11.3	11.3	11.2	11.3	11.4	11.2	11.3	11.4	11.3	11.3	11.4
115	TC	114	122	127	117	123	127	120	124	127	121	124	127	122	125	127
	SHC	100	81	60	109	87	62	111	93	64	113	95	66	114	98	66
	kW	12.3	12.5	12.6	12.4	12.5	12.6	12.4	12.5	12.6	12.5	12.5	12.6	12.5	12.5	12.6
117	TC	108	115	118	122	124	127	123	124	126	123	124	127	124	125	127
	SHC	98	78	57	89	77	64	91	79	64	91	80	66	92	81	66
	kW	13.6	13.8	13.9	12.6	12.7	12.7	12.6	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
120	TC	112	119	123	114	119	123	116	120	123	117	120	123	118	120	123
	SHC	100	80	59	106	85	61	108	89	62	109	92	64	110	96	64
	kW	12.9	13.1	13.2	13.0	13.1	13.2	13.1	13.2	13.2	13.1	13.2	13.2	13.1	13.2	13.2
125	TC	109	115	118	111	115	119	113	116	119	114	116	119	115	116	119
	SHC	98	79	57	103	84	59	105	88	61	106	90	64	107	93	63
	kW	13.6	13.8	13.9	13.7	13.8	13.9	13.7	13.8	13.9	13.8	13.8	13.9	13.8	13.8	13.9

48/50HJ017 (15 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm/BF														
		4500/0.02			5250/0.03			6000/0.04			6750/0.04			7500/0.05		
		Evaporator Air — Ewb (F)														
		62	67	72	62	67	72	62	67	72	62	67	72	62	67	72
75	TC	181	196	213	186	201	217	189	204	219	194	206	220	198	208	223
	SHC	147	124	99	160	133	105	173	143	113	181	153	120	186	163	125
	kW	11.2	11.6	12.0	11.3	11.7	12.1	11.4	11.8	12.1	11.6	11.9	12.2	11.7	11.9	12.2
85	TC	175	190	205	180	194	209	183	198	212	188	200	213	192	202	214
	SHC	145	121	97	157	130	102	168	139	106	175	148	115	180	157	119
	kW	12.3	12.7	13.1	12.5	12.8	13.2	12.6	12.9	13.3	12.7	13.0	13.3	12.8	13.1	13.4
95	TC	168	182	197	172	187	201	176	190	203	181	192	205	185	194	206
	SHC	142	118	93	154	127	98	164	136	102	170	144	108	174	153	113
	kW	13.5	13.9	14.3	13.6	14.0	14.4	13.8	14.1	14.5	13.9	14.2	14.6	14.0	14.3	14.6
105	TC	161	174	188	165	178	191	169	181	193	173	182	194	177	184	194
	SHC	138	115	91	150	124	95	158	132	98	162	140	103	166	148	107
	kW	14.8	15.2	15.6	14.9	15.3	15.7	15.1	15.4	15.7	15.2	15.5	15.8	15.3	15.5	15.8
115	TC	152	165	179	157	168	180	161	171	181	166	172	183	169	174	183
	SHC	134	111	87	145	120	91	151	128	94	155	136	98	158	142	101
	kW	16.1	16.5	16.9	16.2	16.6	17.0	16.4	16.7	17.0	16.6	16.8	17.1	16.7	16.9	17.1
120	TC	148	161	—	153	—	—	157	—	—	—	—	—	—	—	—
	SHC	132	110	—	142	—	—	147	—	—	—	—	—	—	—	—
	kW	16.8	17.2	—	16.9	—	—	17.1	—	—	—	—	—	—	—	—
125	TC	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	SHC	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	kW	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Performance data (cont)

COOLING CAPACITIES (cont)

48/50HJ025 (20 TONS)

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm/BF														
		6000/0.04			7000/0.05			8000/0.06			9000/0.07			10,000/0.08		
		Evaporator Air — Ewb (F)														
		62	67	72	62	67	72	62	67	72	62	67	72	62	67	72
75	TC	238	260	283	244	266	288	249	269	293	255	273	297	260	276	300
	SHC	198	166	134	215	178	145	229	192	151	240	204	159	248	216	166
	kW	15.7	16.3	16.9	15.9	16.5	17.1	16.1	16.6	17.2	16.3	16.7	17.4	16.4	16.8	17.5
85	TC	231	252	274	236	258	281	242	262	284	246	264	288	251	267	291
	SHC	194	163	131	210	175	138	224	187	146	234	200	156	243	211	163
	kW	17.0	17.6	18.2	17.2	17.8	18.5	17.4	17.9	18.6	17.6	18.0	18.7	17.7	18.2	18.8
95	TC	222	242	264	227	247	270	232	252	274	238	255	278	243	257	281
	SHC	189	159	127	205	171	135	218	183	141	227	194	148	235	205	155
	kW	18.3	18.9	19.6	18.5	19.1	19.9	18.7	19.3	20.0	18.9	19.4	20.1	19.1	19.6	20.2
105	TC	211	231	252	218	236	258	223	240	262	228	243	265	234	245	269
	SHC	185	155	123	200	167	130	211	178	138	220	189	144	226	200	151
	kW	19.7	20.3	21.0	19.9	20.5	21.2	20.2	20.7	21.4	20.4	20.8	21.5	20.6	20.9	21.6
115	TC	202	220	241	207	224	245	213	228	249	218	230	253	223	232	255
	SHC	180	151	119	194	162	127	204	173	133	210	185	140	216	195	146
	kW	21.2	21.8	22.5	21.4	22.0	22.6	21.6	22.2	22.8	21.9	22.2	23.0	22.1	22.4	23.0
125	TC	191	208	227	196	212	—	202	215	—	207	217	—	213	219	—
	SHC	175	146	115	186	157	—	195	168	—	200	179	—	205	188	—
	kW	22.7	23.3	23.9	22.9	23.5	—	23.2	23.6	—	23.4	23.7	—	23.6	23.8	—

LEGEND

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb
kW — Compressor Motor Power Input
ldb — Leaving Dry-Bulb
lwb — Leaving Wet-Bulb
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

3. The SHC is based on 80 F edb temperature of air entering evaporator coil.
   Below 80 F edb, subtract (corr factor x cfm) from SHC.
   Above 80 F edb, add (corr factor x cfm) to SHC.

BYPASS FACTOR (BF)	ENTERING AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
.05	1.04	2.07	3.11	4.14	5.18	Use formula shown below.
.10	.98	1.96	2.94	3.92	4.90	
.20	.87	1.74	2.62	3.49	4.36	
.30	.76	1.53	2.29	3.05	3.82	

Interpolation is permissible.
Correction Factor = 1.10 x (1 – BF) x (edb – 80).

COOLING CAPACITIES (cont)

48/50HJ015 (12 TONS) UNITS WITH MOISTUREMI$ER OPTION

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm/BF														
		3600/0.03			4375/0.04			5000/0.05045			5625/0.06			6250/0.07		
		Evaporator Air — Ewb (F)														
		62	67	72	62	67	72	62	67	72	62	67	72	62	67	72
75	TC	—	139	153	130	144	153	135	145	155	138	147	159	145	149	156
	SHC	—	81	63	111	93	68	118	98	68	125	104	72	135	109	72
	kW	—	8.0	8.2	7.9	8.3	8.2	7.9	8.1	8.3	8.0	8.2	8.3	8.3	8.2	8.3
85	TC	—	133	142	125	137	146	129	138	146	132	140	148	135	142	148
	SHC	—	75	56	105	84	61	113	93	62	120	98	66	125	100	67
	kW	—	8.9	9.1	8.8	9.2	9.2	8.8	9.0	9.0	8.8	9.0	9.2	9.1	9.1	9.3
95	TC	—	126	135	119	129	137	123	132	139	125	133	139	128	135	139
	SHC	—	70	52	99	78	56	106	84	59	112	90	60	117	95	61
	kW	—	9.9	10.1	9.7	9.9	10.1	9.9	10.0	10.2	9.9	10.1	10.1	9.9	10.1	10.1
105	TC	105	119	127	110	122	130	113	124	130	115	125	131	118	126	132
	SHC	80	65	47	92	73	51	97	78	52	104	83	55	108	89	57
	kW	10.6	10.9	11.1	10.8	11.0	11.2	10.9	11.0	11.1	10.8	11.0	11.2	10.9	11.1	11.3
115	TC	90	108	119	97	112	121	97	115	122	100	116	123	106	118	123
	SHC	66	57	41	79	66	45	80	72	47	88	76	49	95	80	51
	kW	11.7	12.1	12.3	11.8	12.2	12.4	11.8	12.3	12.5	12.0	12.4	12.5	12.1	12.3	12.5
117	TC	86	100	111	98	112	121	99	114	121	102	116	123	107	117	123
	SHC	64	52	38	63	58	45	67	61	47	72	63	48	77	66	50
	kW	12.8	13.2	13.6	12.0	12.3	12.5	12.0	12.3	12.5	11.9	12.4	12.5	12.1	12.4	12.5
120	TC	90	102	114	90	107	117	91	109	118	93	111	119	99	113	119
	SHC	67	52	38	71	61	41	76	66	44	81	70	46	87	75	47
	kW	12.3	12.6	12.8	12.3	12.7	12.9	12.3	12.8	12.9	12.3	12.8	13.0	12.5	12.9	13.0
125	TC	83	95	109	85	97	112	87	103	113	88	105	114	90	107	114
	SHC	61	47	35	66	53	38	72	61	41	76	66	44	78	70	45
	kW	12.8	13.1	13.5	12.8	13.1	13.5	12.9	13.3	13.5	12.8	13.4	13.6	12.9	13.4	13.6

48/50HJ017 (15 TONS) UNITS WITH MOISTUREMI$ER OPTION

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm/BF														
		4500/0.02			5250/0.03			6000/0.03905			6750/0.04			7500/0.05		
		Evaporator Air — Ewb (F)														
		62	67	72	62	67	72	62	67	72	62	67	72	62	67	72
75	TC	—	185	203	175	191	209	179	195	212	182	198	213	186	200	216
	SHC	—	105	82	141	115	88	154	125	96	165	135	104	174	145	109
	kW	—	11.3	11.7	11.0	11.4	11.8	11.1	11.5	11.9	11.2	11.6	11.9	11.3	11.7	12.0
85	TC	—	176	193	166	183	199	170	186	202	173	189	204	177	190	205
	SHC	—	98	74	134	108	81	145	116	85	156	126	93	162	134	97
	kW	—	12.3	12.7	12.1	12.9	13.4	12.1	12.6	13.5	12.2	12.7	13.5	12.7	12.2	12.7
95	TC	—	168	182	156	173	187	160	176	191	163	178	194	167	181	196
	SHC	—	91	66	126	100	72	137	108	76	146	116	82	153	125	86
	kW	—	13.7	13.5	13.1	13.6	13.9	13.2	13.6	14.1	13.3	13.4	14.3	13.5	13.9	14.6
105	TC	—	156	173	145	160	175	148	162	177	151	166	178	154	167	180
	SHC	—	83	59	117	90	62	127	98	66	136	106	70	141	112	74
	kW	—	14.5	15.3	14.2	14.8	15.1	14.4	14.5	15.1	14.4	14.9	14.9	14.2	14.6	14.9
115	TC	—	141	156	130	146	160	132	150	162	135	150	164	139	152	166
	SHC	—	72	47	104	79	52	112	86	55	119	93	59	127	100	63
	kW	—	15.6	15.9	15.2	15.8	16.2	15.3	16.1	16.3	15.4	16.0	16.4	15.8	16.1	16.4
118	TC	—	138	151	126	141	153	129	144	—	134	145	—	135	148	—
	SHC	—	68	43	100	74	46	108	83	—	120	88	—	124	96	—
	kW	—	16.1	16.5	15.7	16.1	16.5	15.8	16.3	—	16.0	16.3	—	15.9	16.3	—
120	TC	—	134	—	124	—	—	126	—	—	—	—	—	—	—	—
	SHC	—	65	—	99	—	—	106	—	—	—	—	—	—	—	—
	kW	—	16.2	—	15.9	—	—	16.0	—	—	—	—	—	—	—	—
125	TC	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	SHC	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	kW	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Performance data (cont)

COOLING CAPACITIES (cont)

48/50HJ025 (20 TONS) UNITS WITH MOISTUREMI$ER OPTION

Temp (F) Air Entering Condenser (Edb)		Evaporator Air Quantity — Cfm/BF														
		5700/0.03			6650/0.05			7600/0.06			8550/0.07			9500/0.08		
		Evaporator Air — Ewb (F)														
		62	67	72	62	67	72	62	67	72	62	67	72	62	67	72
75	TC	—	243	268	—	250	271	236	253	277	238	262	287	241	265	286
	SHC	—	140	110	—	153	120	203	167	126	215	181	136	223	192	144
	kW	—	14.8	15.5	—	14.9	15.2	15.7	16.0	15.3	15.7	16.4	17.2	15.7	16.5	16.7
85	TC	—	234	258	—	241	264	226	245	269	229	250	274	232	253	277
	SHC	—	132	101	—	144	108	195	156	116	205	170	125	217	181	132
	kW	—	17.2	18.0	—	17.5	18.1	17.0	16.9	18.4	17.1	18.2	17.7	16.7	18.3	18.4
95	TC	—	221	243	206	227	250	211	233	257	216	238	261	219	239	265
	SHC	—	122	90	168	133	97	182	146	104	193	156	111	206	167	118
	kW	—	18.3	18.9	18.1	18.5	19.3	18.3	19.1	19.5	18.5	19.2	20.4	18.7	19.1	20.2
105	TC	—	205	227	192	215	234	198	217	238	200	217	243	201	221	245
	SHC	—	110	79	156	123	85	168	132	92	178	141	98	189	152	103
	kW	—	19.7	20.5	19.1	20.4	20.4	19.7	19.7	20.8	19.3	20.0	20.8	19.6	20.2	20.7
115	TC	—	184	208	173	190	215	173	197	220	178	202	223	181	202	228
	SHC	—	92	64	137	104	71	145	116	76	159	127	82	170	135	88
	kW	—	20.8	21.3	20.3	20.6	21.5	20.6	21.3	21.9	20.8	21.5	22.0	20.9	21.5	22.5
125	TC	—	167	186	160	174	—	161	176	—	166	177	—	166	187	—
	SHC	—	79	47	125	89	—	134	98	—	147	107	—	156	123	—
	kW	—	21.9	22.7	21.8	22.6	—	21.8	22.4	—	22.1	22.0	—	22.2	22.6	—

LEGEND

BF — Bypass Factor
Edb — Entering Dry-Bulb
Ewb — Entering Wet-Bulb
kW — Compressor Motor Power Input
ldb — Leaving Dry-Bulb
lwb — Leaving Wet-Bulb
SHC — Sensible Heat Capacity (1000 Btuh) Gross
TC — Total Capacity (1000 Btuh) Gross

NOTES:
1. Direct interpolation is permissible. Do not extrapolate.
2. The following formulas may be used:

$$t_{ldb} = t_{edb} - \frac{\text{sensible capacity (Btuh)}}{1.10 \times \text{cfm}}$$

t_{lwb} = Wet-bulb temperature corresponding to enthalpy of air leaving evaporator coil (h_{lwb})

$$h_{lwb} = h_{ewb} - \frac{\text{total capacity (Btuh)}}{4.5 \times \text{cfm}}$$

Where: h_{ewb} = Enthalpy of air entering evaporator coil

3. The SHC is based on 80 F edb temperature of air entering evaporator coil.
Below 80 F edb, subtract (corr factor x cfm) from SHC.
Above 80 F edb, add (corr factor x cfm) to SHC.

BYPASS FACTOR (BF)	ENTERING AIR DRY-BULB TEMP (F)					
	79	78	77	76	75	under 75
	81	*82*	*83*	*84*	*85*	*over 85*
	Correction Factor					
.05	1.04	2.07	3.11	4.14	5.18	Use formula shown below.
.10	.98	1.96	2.94	3.92	4.90	
.20	.87	1.74	2.62	3.49	4.36	
.30	.76	1.53	2.29	3.05	3.82	

Interpolation is permissible.
Correction Factor = 1.10 x (1 – BF) x (edb – 80).

GLYCOL HEATING PERFORMANCE

GLYCOL COIL (50HJ015-025)

Temperature Entering Condenser		Air Entering Evaporator — Cfm																	
		4400						5400						7200					
		Percent Glycol																	
		25			50			25			50			25			50		
Edb	Ewt	Cap	Gpm	Ldb	Cap	Gpm	Ldb	Cap	Gpm	Ldb	Cap	Gpm	Ldb	Cap	Gpm	Ldb	Cap	Gpm	Ldb
55	200	310	33	120	293	33	116	347	37	115	327	37	111	405	43	107	381	43	104
	180	255	27	108	237	27	105	285	30	104	264	30	101	332	35	98	306	35	95
	160	200	21	97	181	21	93	223	24	94	202	23	90	259	27	89	233	27	85
70	200	274	29	127	257	29	124	306	32	123	287	33	119	357	38	116	333	38	113
	180	218	23	116	201	23	112	244	26	112	224	26	109	284	30	107	259	30	104
	160	164	17	104	146	17	100	183	19	101	162	19	98	212	22	97	187	22	94
80	200	249	26	132	233	27	129	279	30	128	260	30	125	325	34	122	302	34	119
	180	194	21	121	177	20	117	217	23	117	197	23	114	252	26	113	228	27	109
	160	140	15	109	123	14	106	156	16	107	136	16	103	180	18	103	156	19	100

GLYCOL COIL (50HJ015-025) (cont)

Temperature Entering Condenser		Air Entering Evaporator — Cfm					
		9000					
		25			50		
Edb	Ewt	Cap	Gpm	Ldb	Cap	Gpm	Ldb
55	200	453	48	102	425	48	99
	180	371	39	93	342	39	90
	160	290	31	85	260	30	82
70	200	400	42	111	372	42	108
	180	317	34	103	287	33	100
	160	237	25	94	208	24	91
80	200	364	39	118	337	38	115
	180	281	30	109	254	29	106
	160	201	21	101	173	20	78

GLYCOL COIL RATINGS (50HJ015-025)

Entering Fluid Temp (F)	Cfm									
	4,000		5,000		6,000		8,000		10,000	
	Gpm	ΔP*	Gpm	ΔP*	Gpm	ΔP*	Gpm	ΔP*	Gpm	ΔP*
200	27	1.2	31	1.5	35	1.8	41	2.4	47	2.9
180	22	0.9	25	1.1	27	1.3	32	1.6	36	2.0
160	16	0.6	19	0.7	20	0.8	24	1.0	27	1.2

LEGEND

Cap — Btuh × 1000
Edb — Entering Dry Bulb Temperature (F)
Ewt — Entering Water Temperature (F)
Gpm — Gallons Per Minute
Ldb — Leaving Dry-Bulb Temperature (F)

*ΔP is the fluid pressure in ft of head.

NOTES:
1. This accessory glycol coil is intended for use with a MINIMUM of 25% glycol solution. It IS NOT intended for use solely with water due to freeze-up conditions and the resulting water damage to the conditioned space.
2. Water Δ = 20 F.

Performance data (cont)

FAN PERFORMANCE — 48HJ015-025 UNITS

48HJD015 WITH STANDARD MOTOR (Low Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	753	915	1.05	838	1066	1.23	945	1278	1.47	1044	1500	1.73	1138	1731	1.99
4000	755	991	1.14	865	1198	1.38	968	1414	1.63	1063	1639	1.89	1154	1873	2.15
4250	788	1129	1.30	894	1341	1.54	992	1562	1.80	1084	1791	2.06	1172	2029	2.33
4500	822	1280	1.47	923	1497	1.72	1017	1722	1.98	1106	1956	2.25	1191	2196	2.53
4750	857	1443	1.66	953	1666	1.92	1044	1896	2.18	1130	2133	2.45	1212	2377	2.73
5000	891	1620	1.86	984	1847	2.12	1071	2082	2.39	1154	2323	2.67	1234	2572	2.96
5250	927	1810	2.08	1015	2043	2.35	1099	2282	2.62	1180	2528	2.91	—	—	—
5500	962	2014	2.32	1047	2252	2.59	1129	2496	2.87	—	—	—	—	—	—
5750	998	2233	2.57	1080	2476	2.85	—	—	—	—	—	—	—	—	—
6000	1035	2466	2.84	—	—	—	—	—	—	—	—	—	—	—	—

48HJD015 WITH STANDARD MOTOR (Low Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1226	1971	2.27	1311	2218	2.55	1391	2474	2.85	—	—	—	—	—	—
4000	1240	2116	2.43	1322	2366	2.72	1401	2623	3.02	—	—	—	—	—	—
4250	1255	2274	2.61	1335	2526	2.91	—	—	—	—	—	—	—	—	—
4500	1272	2444	2.81	1350	2700	3.10	—	—	—	—	—	—	—	—	—
4750	1291	2628	3.02	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 834 to 1064 rpm (for 208/230 and 460-v units) or 1105 to 1321 rpm (for 575-v units). Alternate high-static drive range is 1161 to 1426 (for 208/230 and 460-v units). The alternate high-static drive is not available for 575-v units. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 3.13 (for 208/230 and 460-v units) or 3.38 (for 575-v units). The maximum continuous watts is 2700 (for 208/230 and 460-v units) or 3065 (for 575-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

FAN PERFORMANCE — 48HJ015-025 UNITS (cont)

48HJD015 WITH OPTIONAL MOTOR (Low Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	753	942	1.08	838	1091	1.25	945	1298	1.49	1044	1513	1.74	1138	1737	2.00
4000	755	1020	1.17	865	1223	1.41	968	1433	1.65	1063	1652	1.90	1154	1878	2.16
4250	788	1159	1.33	894	1366	1.57	992	1581	1.82	1084	1803	2.07	1172	2032	2.34
4500	822	1311	1.51	923	1522	1.75	1017	1740	2.00	1106	1966	2.26	1191	2197	2.53
4750	857	1474	1.70	953	1690	1.94	1044	1912	2.20	1130	2141	2.46	1212	2376	2.73
5000	891	1650	1.90	984	1871	2.15	1071	2097	2.41	1154	2329	2.68	1234	2567	2.95
5250	927	1840	2.12	1015	2065	2.37	1099	2295	2.64	1180	2530	2.91	1257	2771	3.19
5500	962	2042	2.35	1047	2272	2.61	1129	2506	2.88	1207	2745	3.16	1281	2989	3.44
5750	998	2259	2.60	1080	2492	2.87	1159	2730	3.14	1234	2973	3.42	1307	3221	3.70
6000	1035	2489	2.86	1114	2727	3.14	1189	2969	3.41	1262	3215	3.70	1333	3466	3.99

48HJD015 WITH OPTIONAL MOTOR (Low Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1226	1968	2.26	1311	2206	2.54	1391	2451	2.82	1468	2702	3.11	1543	2959	3.40
4000	1240	2111	2.43	1322	2351	2.70	1401	2598	2.99	1476	2850	3.28	1549	3108	3.57
4250	1255	2267	2.61	1335	2509	2.89	1412	2757	3.17	1486	3011	3.46	—	—	—
4500	1272	2436	2.80	1350	2680	3.08	1425	2929	3.37	1497	3185	3.66	—	—	—
4750	1291	2616	3.01	1366	2863	3.29	1440	3115	3.58	1510	3372	3.88	—	—	—
5000	1310	2810	3.23	1384	3059	3.52	1456	3314	3.81	1525	3573	4.11	—	—	—
5250	1332	3018	3.47	1403	3269	3.76	1473	3526	4.05	—	—	—	—	—	—
5500	1354	3238	3.72	1424	3492	4.02	1491	3751	4.31	—	—	—	—	—	—
5750	1377	3473	3.99	1445	3730	4.29	—	—	—	—	—	—	—	—	—
6000	1401	3722	4.28	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 834 to 1064 rpm. Alternate high-static drive range is 1161 to 1426. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 4.38. The maximum continuous watts is 3775. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Performance data (cont)

FAN PERFORMANCE — 48HJ015-025 UNITS (cont)

48HJD017 (Low Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	753	1307	1.53	761	1330	1.56	840	1572	1.84	912	1822	2.14	980	2080	2.44
4800	747	1384	1.62	790	1515	1.78	866	1765	2.07	936	2023	2.37	1002	2289	2.68
5100	741	1465	1.72	820	1718	2.01	893	1977	2.32	961	2243	2.63	1025	2516	2.95
5700	810	1911	2.24	882	2182	2.56	950	2459	2.88	1014	2741	3.21	1075	3029	3.55
6000	844	2164	2.54	914	2444	2.87	980	2730	3.20	1042	3021	3.54	1100	3317	3.89
6300	879	2439	2.86	947	2729	3.20	1010	3023	3.55	1070	3322	3.90	1127	3626	4.25
6600	915	2737	3.21	980	3035	3.56	1041	3338	3.91	1099	3645	4.28	1155	3957	4.64
6900	950	3057	3.59	1013	3364	3.95	1072	3675	4.31	1129	3991	4.68	1183	4311	5.06
7200	986	3401	3.99	1047	3717	4.36	1104	4037	4.74	1159	4361	5.11	1211	4689	5.50
7500	1022	3770	4.42	1081	4095	4.80	1136	4423	5.19	1189	4755	5.58	1241	5091	5.97

48HJD017 (Low Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1044	2345	2.75	1105	2619	3.07	1163	2899	3.40	1218	3187	3.74	1271	3481	4.08
4800	1065	2561	3.00	1124	2841	3.33	1180	3127	3.67	1235	3420	4.01	1287	3720	4.36
5100	1086	2795	3.28	1144	3082	3.61	1199	3375	3.96	1252	3674	4.31	1304	3979	4.67
5700	1132	3324	3.90	1187	3624	4.25	1240	3929	4.61	1291	4241	4.97	1341	4558	5.35
6000	1157	3619	4.24	1210	3925	4.60	1262	4239	4.97	1312	4557	5.34	1361	4880	5.72
6300	1182	3935	4.62	1234	4249	4.98	1285	4569	5.36	1334	4894	5.74	—	—	—
6600	1208	4274	5.01	1259	4595	5.39	1309	4922	5.77	—	—	—	—	—	—
6900	1235	4636	5.44	1285	4964	5.82	—	—	—	—	—	—	—	—	—
7200	1262	5021	5.89	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

48HJD017 (Low Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1322	3781	4.43	1372	4088	4.79	1419	4400	5.16	1466	4719	5.53	1511	5042	5.91
4800	1337	4025	4.72	1386	4337	5.09	1433	4655	5.46	1479	4978	5.84	—	—	—
5100	1353	4290	5.03	1401	4607	5.40	1448	4930	5.78	—	—	—	—	—	—
5700	1388	4881	5.72	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 873 to 1021 rpm. Alternate high-static drive range is 1025 to 1200. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 6.13. The maximum continuous watts is 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

FAN PERFORMANCE — 48HJ015-025 UNITS (cont)

48HJD025 (Low Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	824	2607	3.09	894	2844	3.37	961	3085	3.66	1023	3330	3.95	1083	3578	4.24
6,500	881	3030	3.59	947	3266	3.88	1009	3507	4.16	1069	3751	4.45	1126	3998	4.74
7,000	939	3488	4.14	1001	3725	4.42	1060	3965	4.70	1116	4208	4.99	1170	4454	5.28
7,500	998	3982	4.72	1055	4218	5.00	1111	4458	5.29	1165	4701	5.58	1217	4946	5.87
8,000	1056	4512	5.35	1111	4748	5.63	1164	4988	5.92	1215	5230	6.20	1264	5474	6.49
8,500	1116	5077	6.02	1167	5314	6.30	1218	5553	6.59	1266	5795	6.87	1314	6039	7.16
9,000	1175	5678	6.74	1224	5915	7.02	1272	6154	7.30	1319	6395	7.59	1364	6639	7.88
9,500	1235	6315	7.49	1282	6552	7.77	1327	6791	8.06	1372	7033	8.34	1415	7276	8.63
10,000	1295	6988	8.29	1340	7225	8.57	1383	7465	8.86	1426	7706	9.14	1468	7949	9.43

48HJD025 (Low Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1141	3829	4.54	1196	4082	4.84	1249	4337	5.15	1301	4596	5.45	1351	4856	5.76
6,500	1181	4247	5.04	1234	4499	5.34	1285	4753	5.64	1334	5009	5.94	1383	5267	6.25
7,000	1223	4702	5.58	1274	4953	5.88	1323	5205	6.18	1371	5460	6.48	1417	5716	6.78
7,500	1267	5194	6.16	1316	5443	6.46	1363	5694	6.76	1409	5947	7.06	1454	6202	7.36
8,000	1313	5721	6.79	1359	5970	7.08	1405	6220	7.38	1449	6472	7.68	1493	6726	7.98
8,500	1360	6285	7.46	1405	6533	7.75	1449	6783	8.05	1491	7034	8.34	1533	7286	8.64
9,000	1408	6885	8.17	1451	7132	8.46	1494	7381	8.76	1535	7631	9.05	—	—	—
9,500	1458	7521	8.92	1499	7768	9.22	1540	8016	9.51	—	—	—	—	—	—
10,000	1508	8193	9.72	1549	8440	10.01	—	—	—	—	—	—	—	—	—

48HJD025 (Low Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1399	5118	6.07	1446	5381	6.38	1492	5647	6.70	1537	5914	7.02	—	—	—
6,500	1429	5527	6.56	1475	5789	6.87	1520	6052	7.18	—	—	—	—	—	—
7,000	1462	5974	7.09	1507	6234	7.40	1550	6495	7.71	—	—	—	—	—	—
7,500	1498	6459	7.66	1540	6717	7.97	—	—	—	—	—	—	—	—	—
8,000	1535	6981	8.28	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 1002 to 1151 rpm. Alternate high-static drive range is 1193 to 1369. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 9.47 (for 208 and 575-v units) and 10.33 (for 230 and 460-v units). The maximum continuous watts is 7915 (for 208 and 575-v units) and 8640 (for 230 and 460-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Performance data (cont)

FAN PERFORMANCE — 48HJ015-025 UNITS (cont)

48HJF015 WITH STANDARD MOTOR (High Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	753	915	1.05	844	1077	1.24	949	1287	1.48	1047	1507	1.73	1139	1735	2.00
4000	764	1006	1.16	872	1211	1.39	972	1425	1.64	1067	1648	1.90	1156	1880	2.16
4250	798	1147	1.32	901	1357	1.56	997	1576	1.81	1089	1803	2.07	1175	2038	2.34
4500	832	1301	1.50	931	1516	1.74	1024	1739	2.00	1112	1970	2.27	1195	2209	2.54
4750	868	1467	1.69	962	1688	1.94	1051	1916	2.20	1136	2151	2.47	1217	2393	2.75
5000	903	1648	1.89	994	1873	2.15	1079	2106	2.42	1161	2345	2.70	1240	2590	2.98
5250	939	1842	2.12	1026	2073	2.38	1109	2309	2.66	1188	2553	2.94	—	—	—
5500	976	2050	2.36	1059	2286	2.63	1139	2528	2.91	—	—	—	—	—	—
5750	1012	2273	2.61	1093	2514	2.89	—	—	—	—	—	—	—	—	—
6000	1049	2511	2.89	—	—	—	—	—	—	—	—	—	—	—	—

48HJF015 WITH STANDARD MOTOR (High Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1227	1973	2.27	1310	2218	2.55	1390	2471	2.84	—	—	—	—	—	—
4000	1241	2120	2.44	1323	2368	2.72	1400	2623	3.02	—	—	—	—	—	—
4250	1258	2281	2.62	1337	2531	2.91	—	—	—	—	—	—	—	—	—
4500	1275	2454	2.82	—	—	—	—	—	—	—	—	—	—	—	—
4750	1295	2642	3.04	—	—	—	—	—	—	—	—	—	—	—	—
5000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 834 to 1064 rpm (for 208/230 and 460-v units) or 1105 to 1321 rpm (for 575-v units). Alternate high-static drive range is 1161 to 1426 (for 208/230 and 460-v units). The alternate high-static drive is not available for 575-v units. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 3.13 (for 208/230 and 460-v units) or 3.38 (for 575-v units). The maximum continuous watts is 2700 (for 208/230 and 460-v units) or 3065 (for 575-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

FAN PERFORMANCE — 48HJ015-025 UNITS (cont)

48HJF015 WITH OPTIONAL MOTOR (High Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	753	942	1.08	844	1101	1.27	949	1306	1.50	1047	1520	1.75	1139	1741	2.00
4000	764	1035	1.19	872	1236	1.42	972	1444	1.66	1067	1661	1.91	1156	1885	2.17
4250	798	1177	1.35	901	1382	1.59	997	1594	1.83	1089	1814	2.09	1175	2041	2.35
4500	832	1331	1.53	931	1540	1.77	1024	1757	2.02	1112	1980	2.28	1195	2209	2.54
4750	868	1498	1.72	962	1711	1.97	1051	1932	2.22	1136	2158	2.48	1217	2390	2.75
5000	903	1677	1.93	994	1896	2.18	1079	2120	2.44	1161	2350	2.70	1240	2585	2.97
5250	939	1871	2.15	1026	2093	2.41	1109	2321	2.67	1188	2554	2.94	1264	2793	3.21
5500	976	2077	2.39	1059	2304	2.65	1139	2536	2.92	1215	2773	3.19	1289	3015	3.47
5750	1012	2298	2.64	1093	2529	2.91	1170	2765	3.18	1244	3005	3.46	1315	3250	3.74
6000	1049	2533	2.91	1127	2768	3.18	1201	3008	3.46	1273	3252	3.74	1342	3500	4.03

48HJF015 WITH OPTIONAL MOTOR (High Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1227	1970	2.27	1310	2206	2.54	1390	2448	2.82	1467	2696	3.10	1541	2951	3.39
4000	1241	2116	2.43	1323	2353	2.71	1400	2597	2.99	1475	2847	3.27	1548	3102	3.57
4250	1258	2274	2.62	1337	2513	2.89	1413	2759	3.17	1486	3010	3.46	—	—	—
4500	1275	2445	2.81	1352	2687	3.09	1426	2934	3.37	1498	3187	3.67	—	—	—
4750	1295	2629	3.02	1369	2873	3.30	1442	3122	3.59	1511	3377	3.88	—	—	—
5000	1315	2826	3.25	1388	3073	3.53	1458	3324	3.82	1527	3581	4.12	—	—	—
5250	1337	3037	3.49	1408	3286	3.78	1477	3540	4.07	—	—	—	—	—	—
5500	1360	3262	3.75	1429	3513	4.04	1496	3769	4.34	—	—	—	—	—	—
5750	1384	3500	4.03	1452	3755	4.32	—	—	—	—	—	—	—	—	—
6000	1410	3753	4.32	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 834 to 1064 rpm. Alternate high-static drive range is 1161 to 1426. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 4.38. The maximum continuous watts is 3775. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Performance data (cont)

FAN PERFORMANCE — 48HJ015-025 UNITS (cont)

48HJF017 (High Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	753	1307	1.53	786	1404	1.65	861	1644	1.93	932	1893	2.22	997	2150	2.52
4800	747	1384	1.62	818	1603	1.88	890	1852	2.17	958	2108	2.47	1022	2373	2.78
5100	775	1571	1.84	850	1822	2.14	920	2079	2.44	986	2344	2.75	1048	2616	3.07
5700	849	2054	2.41	918	2323	2.73	982	2598	3.05	1044	2879	3.38	1102	3166	3.71
6000	886	2329	2.73	952	2607	3.06	1015	2891	3.39	1074	3180	3.73	1130	3474	4.08
6300	924	2628	3.08	987	2915	3.42	1047	3207	3.76	1105	3504	4.11	1160	3807	4.46
6600	962	2951	3.46	1023	3246	3.81	1081	3547	4.16	1136	3853	4.52	1190	4163	4.88
6900	1000	3298	3.87	1059	3603	4.23	1115	3912	4.59	1168	4225	4.96	1220	4543	5.33
7200	1038	3672	4.31	1095	3986	4.67	1149	4303	5.05	1201	4625	5.42	1251	4950	5.81
7500	1077	4072	4.78	1131	4394	5.15	1184	4720	5.54	1234	5050	5.92	—	—	—

48HJF017 (High Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1060	2414	2.83	1119	2685	3.15	1175	2964	3.48	1230	3250	3.81	1282	3542	4.15
4800	1082	2644	3.10	1140	2922	3.43	1195	3207	3.76	1248	3498	4.10	1299	3795	4.45
5100	1106	2894	3.39	1163	3178	3.73	1216	3470	4.07	1268	3767	4.42	1319	4071	4.77
5700	1157	3459	4.06	1211	3757	4.41	1262	4061	4.76	1312	4371	5.13	1360	4686	5.50
6000	1184	3774	4.43	1236	4080	4.79	1287	4391	5.15	1335	4707	5.52	1382	5029	5.90
6300	1212	4114	4.83	1263	4427	5.19	1312	4745	5.57	1359	5067	5.94	—	—	—
6600	1241	4478	5.25	1290	4798	5.63	1338	5122	6.01	—	—	—	—	—	—
6900	1270	4866	5.71	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

48HJF017 (High Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1332	3841	4.50	1381	4145	4.86	1428	4456	5.23	1473	4772	5.60	1518	5095	5.98
4800	1349	4100	4.81	1397	4409	5.17	1443	4725	5.54	1488	5046	5.92	—	—	—
5100	1367	4380	5.14	1414	4695	5.51	1460	5016	5.88	—	—	—	—	—	—
5700	1407	5007	5.87	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6300	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 873 to 1021 rpm. Alternate high-static drive range is 1025 to 1200. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 6.13. The maximum continuous watts is 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

FAN PERFORMANCE — 48HJ015-025 UNITS (cont)

48HJF025 (High Heat Units)

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	868	2752	3.26	934	2987	3.54	997	3227	3.83	1058	3470	4.12	1115	3716	4.41
6,500	929	3201	3.80	991	3436	4.08	1051	3675	4.36	1108	3917	4.65	1162	4163	4.94
7,000	991	3687	4.37	1049	3923	4.65	1105	4161	4.94	1159	4403	5.22	1211	4647	5.51
7,500	1054	4211	5.00	1109	4447	5.28	1161	4686	5.56	1213	4926	5.84	1262	5170	6.13
8,000	1117	4773	5.66	1168	5009	5.94	1218	5247	6.22	1267	5488	6.51	1314	5731	6.80
8,500	1180	5373	6.37	1229	5609	6.65	1277	5847	6.94	1323	6088	7.22	1368	6331	7.51
9,000	1244	6011	7.13	1290	6247	7.41	1335	6485	7.69	1380	6726	7.98	1423	6968	8.27
9,500	1308	6687	7.93	1352	6924	8.21	1395	7162	8.50	1437	7402	8.78	1479	7644	9.07
10,000	1372	7401	8.78	1414	7638	9.06	1455	7876	9.34	1496	8117	9.63	1535	8358	9.92

48HJF025 (High Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1171	3965	4.70	1224	4216	5.00	1276	4469	5.30	1326	4726	5.61	1374	4983	5.91
6,500	1215	4410	5.23	1266	4659	5.53	1316	4911	5.83	1364	5165	6.13	1411	5421	6.43
7,000	1262	4894	5.81	1311	5142	6.10	1358	5392	6.40	1404	5645	6.70	1449	5899	7.00
7,500	1310	5415	6.42	1357	5663	6.72	1403	5912	7.01	1447	6164	7.31	1490	6416	7.61
8,000	1360	5976	7.09	1405	6222	7.38	1449	6471	7.68	1492	6721	7.97	1533	6973	8.27
8,500	1412	6575	7.80	1455	6821	8.09	1497	7068	8.39	1538	7318	8.68	—	—	—
9,000	1465	7212	8.56	1506	7457	8.85	1547	7705	9.14	—	—	—	—	—	—
9,500	1519	7888	9.36	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

48HJF025 (High Heat Units) (cont)

Cfm	Available External Static Pressure (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1422	5243	6.22	1468	5505	6.53	1513	5768	6.84	—	—	—	—	—	—
6,500	1456	5679	6.74	1501	5938	7.04	1544	6199	7.35	—	—	—	—	—	—
7,000	1493	6155	7.30	1536	6412	7.61	—	—	—	—	—	—	—	—	—
7,500	1533	6670	7.91	—	—	—	—	—	—	—	—	—	—	—	—
8,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9,500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 1002 to 1151 rpm. Alternate high-static drive range is 1193 to 1369. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 9.47 (for 208 and 575-v units) and 10.33 (for 230 and 460-v units). The maximum continuous watts is 7915 (for 208 and 575-v units) and 8640 (for 230 and 460-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Performance data (cont)

FAN PERFORMANCE — 50HJ015-025 UNITS

50HJ015 WITH STANDARD MOTOR

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	753	915	1.05	786	972	1.12	892	1170	1.35	991	1378	1.58	1084	1595	1.83
4000	747	977	1.12	810	1090	1.25	911	1292	1.49	1007	1503	1.73	1097	1723	1.98
4250	741	1041	1.20	835	1220	1.40	932	1426	1.64	1024	1640	1.89	1111	1863	2.14
4500	761	1158	1.33	861	1360	1.56	954	1570	1.81	1043	1788	2.06	1127	2014	2.32
4750	792	1305	1.50	887	1512	1.74	977	1726	1.99	1063	1948	2.24	1145	2177	2.50
5000	823	1464	1.68	915	1676	1.93	1002	1894	2.18	1084	2120	2.44	1164	2352	2.70
5250	855	1635	1.88	943	1852	2.13	1027	2075	2.39	1107	2304	2.65	1184	2539	2.92
5500	887	1819	2.09	972	2041	2.35	1053	2268	2.61	1130	2501	2.88	—	—	—
5750	920	2016	2.32	1002	2242	2.58	1079	2473	2.84	—	—	—	—	—	—
6000	953	2226	2.56	1031	2457	2.83	1107	2692	3.10	—	—	—	—	—	—
6250	986	2449	2.82	1062	2685	3.09	—	—	—	—	—	—	—	—	—

50HJ015 WITH STANDARD MOTOR (cont)*

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1172	1822	2.10	1256	2057	2.37	1337	2299	2.64	1414	2549	2.93	—	—	—
4000	1182	1952	2.24	1264	2188	2.52	1343	2432	2.80	1418	2683	3.09	—	—	—
4250	1194	2093	2.41	1274	2332	2.68	1351	2577	2.96	—	—	—	—	—	—
4500	1208	2247	2.58	1286	2487	2.86	—	—	—	—	—	—	—	—	—
4750	1223	2412	2.77	1299	2655	3.05	—	—	—	—	—	—	—	—	—
5000	1240	2590	2.98	—	—	—	—	—	—	—	—	—	—	—	—
5250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5750	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 834 to 1064 rpm (for 208/230 and 460-v units) or 1105 to 1321 rpm (for 575-v units). Alternate high-static drive range is 1161 to 1426 (for 208/230 and 460-v units). The alternate high-static drive range is not available for 575-v units. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 3.13 (for 208/230 and 460-v units) or 3.38 (for 575-v units). The maximum continuous watts is 2700 (for 208/230 and 460-v units) or 3065 (for 575-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

FAN PERFORMANCE — 50HJ015-025 UNITS (cont)

50HJ015 WITH OPTIONAL MOTOR

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	753	942	1.08	786	998	1.15	892	1192	1.37	991	1395	1.60	1084	1606	1.85
4000	747	1006	1.16	810	1118	1.29	911	1315	1.51	1007	1520	1.75	1097	1733	1.99
4250	741	1073	1.23	835	1248	1.44	932	1448	1.67	1024	1657	1.91	1111	1872	2.15
4500	761	1191	1.37	861	1389	1.60	954	1593	1.83	1043	1804	2.07	1127	2022	2.33
4750	792	1339	1.54	887	1541	1.77	977	1749	2.01	1063	1963	2.26	1145	2183	2.51
5000	823	1499	1.72	915	1705	1.96	1002	1916	2.20	1084	2133	2.45	1164	2356	2.71
5250	855	1671	1.92	943	1880	2.16	1027	2095	2.41	1107	2316	2.66	1184	2541	2.92
5500	887	1854	2.13	972	2068	2.38	1053	2286	2.63	1130	2510	2.89	1205	2739	3.15
5750	920	2050	2.36	1002	2268	2.61	1079	2490	2.86	1154	2717	3.12	1227	2948	3.39
6000	953	2258	2.60	1031	2480	2.85	1107	2706	3.11	1179	2936	3.38	1249	3171	3.65
6250	986	2480	2.85	1062	2706	3.11	1135	2935	3.38	1205	3169	3.64	1273	3406	3.92

50HJ015 WITH OPTIONAL MOTOR (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
3750	1172	1825	2.10	1256	2051	2.36	1337	2284	2.63	1414	2523	2.90	1488	2768	3.18
4000	1182	1954	2.25	1264	2181	2.51	1343	2415	2.78	1418	2655	3.05	1491	2901	3.34
4250	1194	2094	2.41	1274	2323	2.67	1351	2558	2.94	1424	2799	3.22	1496	3045	3.50
4500	1208	2246	2.58	1286	2476	2.85	1360	2713	3.12	1432	2955	3.40	1502	3202	3.68
4750	1223	2410	2.77	1299	2642	3.04	1371	2880	3.31	1442	3123	3.59	1510	3372	3.88
5000	1240	2585	2.97	1313	2819	3.24	1384	3059	3.52	1453	3304	3.80	1520	3554	4.09
5250	1258	2773	3.19	1329	3009	3.46	1398	3250	3.74	1465	3497	4.02	1530	3748	4.31
5500	1276	2972	3.42	1346	3211	3.69	1413	3455	3.97	1479	3703	4.26	—	—	—
5750	1296	3185	3.66	1364	3426	3.94	1430	3671	4.22	—	—	—	—	—	—
6000	1317	3410	3.92	1383	3653	4.20	—	—	—	—	—	—	—	—	—
6250	1339	3648	4.20	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 834 to 1064 rpm. Alternate high-static drive range is 1161 to 1426. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 4.38. The maximum continuous watts is 3775. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Performance data (cont)

FAN PERFORMANCE — 50HJ015-025 UNITS (cont)

50HJ017

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	753	1307	1.53	753	1307	1.53	784	1397	1.64	859	1635	1.92	928	1880	2.20
4800	747	1384	1.62	747	1384	1.62	806	1563	1.83	878	1808	2.12	946	2060	2.42
5100	741	1465	1.72	752	1500	1.76	828	1745	2.05	898	1996	2.34	964	2255	2.65
5700	735	1659	1.95	805	1895	2.22	876	2156	2.53	942	2423	2.84	1004	2696	3.16
6000	759	1854	2.18	832	2118	2.48	901	2388	2.80	965	2663	3.12	1026	2943	3.45
6300	790	2088	2.45	860	2360	2.77	926	2638	3.09	988	2920	3.43	1048	3208	3.76
6600	821	2340	2.74	888	2621	3.07	952	2906	3.41	1013	3196	3.75	1070	3491	4.10
6900	852	2611	3.06	917	2900	3.40	979	3194	3.75	1038	3492	4.10	1094	3794	4.45
7200	883	2903	3.40	946	3200	3.75	1006	3501	4.11	1063	3807	4.47	1118	4117	4.83
7500	914	3215	3.77	975	3521	4.13	1033	3830	4.49	1089	4143	4.86	1142	4461	5.23

50HJ017 (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	993	2133	2.50	1055	2394	2.81	1114	2662	3.12	1170	2938	3.45	1224	3220	3.78
4800	1009	2319	2.72	1070	2585	3.03	1127	2859	3.35	1183	3139	3.68	1236	3427	4.02
5100	1026	2521	2.96	1086	2794	3.28	1142	3073	3.60	1196	3359	3.94	1248	3650	4.28
5700	1064	2975	3.49	1120	3260	3.82	1174	3551	4.17	1226	3848	4.51	1277	4151	4.87
6000	1083	3228	3.79	1139	3520	4.13	1192	3817	4.48	1243	4119	4.83	1292	4427	5.19
6300	1104	3501	4.11	1158	3799	4.46	1210	4102	4.81	1260	4410	5.17	1309	4724	5.54
6600	1125	3791	4.45	1178	4095	4.80	1229	4405	5.17	1278	4720	5.54	1326	5039	5.91
6900	1147	4101	4.81	1199	4412	5.18	1249	4728	5.55	1297	5050	5.92	—	—	—
7200	1170	4431	5.20	1221	4749	5.57	1270	5072	5.95	—	—	—	—	—	—
7500	1193	4781	5.61	1243	5107	5.99	—	—	—	—	—	—	—	—	—

50HJ017 (cont)

Cfm	Available External Static Pressure (in. wg)																	
	22			2.4			2.6			2.8			3.0			3.2		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
4500	1276	3509	4.12	1326	3805	4.46	1375	4107	4.82	1421	4414	5.18	1467	4728	5.55	1511	5047	5.92
4800	1287	3721	4.36	1336	4020	4.72	1384	4326	5.07	1430	4638	5.44	1475	4955	5.81	—	—	—
5100	1299	3949	4.63	1347	4253	4.99	1395	4563	5.35	1440	4879	5.72	—	—	—	—	—	—
5700	1325	4458	5.23	1373	4772	5.60	1418	5091	5.97	—	—	—	—	—	—	—	—	—
6000	1340	4741	5.56	1387	5060	5.93	—	—	—	—	—	—	—	—	—	—	—	—
6300	1356	5043	5.91	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6900	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7500	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 873 to 1021 rpm. Alternate high-static drive range is 1025 to 1200. Other rpms require a field-supplied drive.

NOTES:
1. Maximum continuous bhp for the standard motor is 6.13. The maximum continuous watts is 5180. Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

FAN PERFORMANCE — 50HJ015-025 UNITS (cont)

50HJ025

Cfm	Available External Static Pressure (in. wg)														
	0.2			0.4			0.6			0.8			1.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	753	2385	2.83	816	2579	3.06	884	2807	3.33	949	3040	3.61	1010	3277	3.89
6,500	793	2738	3.25	861	2959	3.51	925	3186	3.78	987	3418	4.05	1045	3653	4.33
7,000	844	3151	3.74	908	3372	4.00	968	3598	4.27	1026	3828	4.54	1082	4062	4.82
7,500	895	3596	4.27	955	3817	4.53	1013	4042	4.80	1068	4271	5.07	1121	4504	5.34
8,000	947	4073	4.83	1004	4294	5.09	1058	4518	5.36	1111	4747	5.63	1162	4978	5.91
8,500	999	4583	5.44	1053	4803	5.70	1105	5027	5.96	1155	5255	6.23	1204	5485	6.51
9,000	1052	5125	6.08	1103	5345	6.34	1152	5569	6.61	1200	5796	6.88	1247	6025	7.15
9,500	1105	5699	6.76	1153	5919	7.02	1200	6142	7.29	1246	6369	7.56	1291	6598	7.83
10,000	1158	6306	7.48	1204	6526	7.74	1249	6750	8.01	1293	6975	8.27	1336	7203	8.55

50HJ025 (cont)

Cfm	Available External Static Pressure (in. wg)														
	1.2			1.4			1.6			1.8			2.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1069	3517	4.17	1125	3761	4.46	1180	4006	4.75	1232	4255	5.05	1283	4506	5.35
6,500	1102	3891	4.62	1156	4132	4.90	1208	4377	5.19	1259	4623	5.48	1308	4871	5.78
7,000	1136	4299	5.10	1188	4538	5.38	1239	4780	5.67	1288	5025	5.96	1335	5271	6.25
7,500	1173	4739	5.62	1223	4977	5.90	1272	5217	6.19	1319	5460	6.48	1365	5705	6.77
8,000	1211	5212	6.18	1259	5449	6.46	1306	5688	6.75	1352	5929	7.03	1396	6172	7.32
8,500	1251	5718	6.78	1297	5954	7.06	1342	6192	7.35	1386	6431	7.63	1429	6673	7.92
9,000	1292	6257	7.42	1337	6492	7.70	1380	6729	7.98	1423	6967	8.27	1464	7207	8.55
9,500	1335	6830	8.10	1377	7063	8.38	1419	7299	8.66	1460	7536	8.94	1501	7776	9.22
10,000	1378	7434	8.82	1419	7667	9.10	1460	7902	9.37	1499	8138	9.65	1538	8377	9.94

50HJ025 (cont)

Cfm	Available External Static Pressure (in. wg)														
	2.2			2.4			2.6			2.8			3.0		
	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp	Rpm	Watts	Bhp
6,000	1332	4750	5.65	1380	5015	5.95	1427	5272	6.25	1472	5531	6.56	1517	5793	6.87
6,500	1356	5122	6.08	1402	5375	6.38	1447	5630	6.68	1492	5886	6.98	1535	6144	7.29
7,000	1381	5519	6.55	1427	5770	6.84	1471	6022	7.14	1514	6276	7.45	—	—	—
7,500	1409	5951	7.06	1453	6199	7.35	1496	6449	7.65	1538	6701	7.95	—	—	—
8,000	1440	6417	7.61	1482	6663	7.90	1523	6911	8.20	—	—	—	—	—	—
8,500	1471	6916	8.20	1513	7161	8.49	—	—	—	—	—	—	—	—	—
9,000	1505	7449	8.84	1545	7693	9.13	—	—	—	—	—	—	—	—	—
9,500	1540	8016	9.51	—	—	—	—	—	—	—	—	—	—	—	—
10,000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

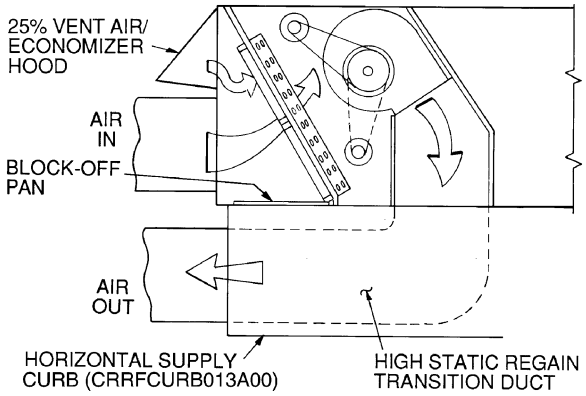
Bhp — Brake Horsepower
FIOP — Factory-Installed Option
Watts — Input Watts to Motor

*Standard low-medium static drive range is 1002 to 1151 rpm. Alternate high-static drive range is 1193 to 1369. Other rpms require a field-supplied drive.

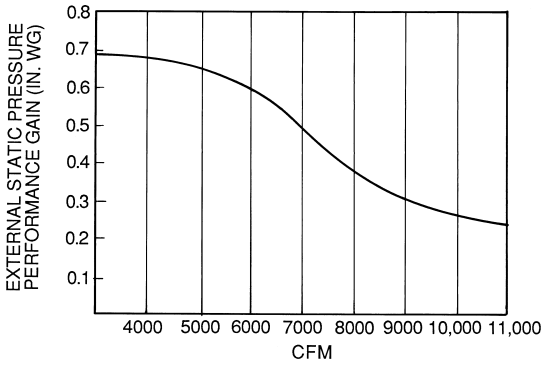
NOTES:
1. Maximum continuous bhp for the standard motor is 9.47 (for 208 and 575-v units) and 10.33 (for 230 and 460-v units). The maximum continuous watts is 7915 (for 208 and 575-v units) and 8640 (for 230 and 460-v units). Do not adjust motor rpm such that motor maximum bhp and/or watts is exceeded at the maximum operating cfm.
2. Static pressure losses (i.e., economizer) must be added to external static pressure before entering Fan Performance table.
3. Interpolation is permissible. Do not extrapolate.
4. Fan performance is based on wet coils, clean filters, and casing losses. See page 43 for accessory/FIOP static pressure information.
5. Extensive motor and drive testing on these units ensures that the full bhp and watts range of the motor can be utilized with confidence. Using your fan motors up to the watts or bhp rating shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.
6. Use of a field-supplied motor may affect wiring size. Contact your Carrier representative for details.

Performance data (cont)

HORIZONTAL SUPPLY/RETURN FAN PERFORMANCE WITH CRRFCURB013A00 HIGH STATIC REGAIN ADAPTER



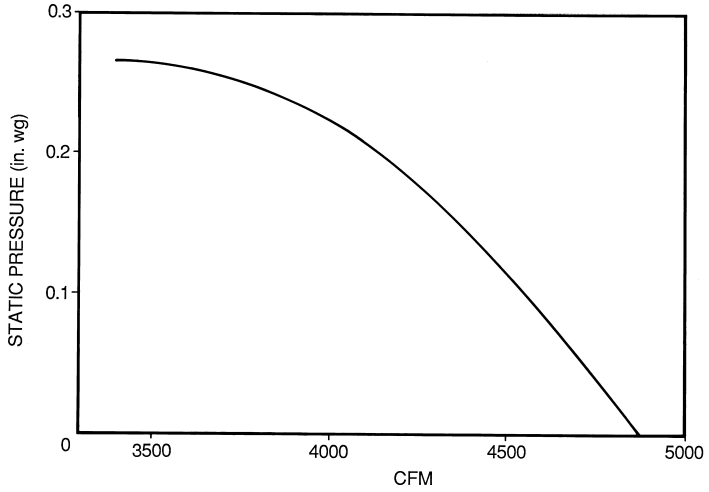
NOTE: The CRRFCURB013A00 high static regain adapter accessory may be used to provide horizontal supply/return.



NOTE: The CRRFCURB013A00 horizontal supply/return adapter accessory improves 48/50HJ015-025 fan performance by increasing external static pressure by amount shown above. To convert from in. wg to Pa use the following formula:

in. wg x 249.1 = Pa

FAN PERFORMANCE USING ACCESSORY POWER EXHAUST (48/50HJ015-025)



ALTITUDE COMPENSATION* — 48HJ015-025

ELEVATION (ft)	NATURAL GAS ORIFICE SIZE†	
	Low Heat	High Heat
0-3,000	30	29
3,000- 7,000	31	30
7,000- 9,000	32	31
9,000-10,000	33	31
above 10,000	35	32

*Includes a 4% input reduction per each 1,000 feet.
†Orifices available through your Carrier dealer.

ALTITUDE DERATING FACTOR* — 48HJ015-025

ELEVATION (ft)	MAXIMUM HEATING VALUE (Btu/ft^3)
0-2,000	1,100
2,001-3,000	1,050
3,001-4,000	1,000
4,001-5,000	950
5,001-6,000	900

*Derating of the unit is not required unless the heating value of the gas exceeds the values listed in the table above, or if the elevation exceeds 6000 ft. Derating conditions must be 4% per thousand ft above sea level. For example, at 4000 ft, if the heating value of the gas exceeds 1000 Btu/ft^3, the unit will require a 16% derating. For elevations above 6000 ft, the same formula applies. For example, at 7000 ft, the unit will require a 28% derating of the maximum heating value per the National Fuel Gas Code.

ALTITUDE COMPENSATION — 48HJ015-025 (LP Gas Units)

ELEVATION (ft)	LIQUID PROPANE ORIFICE SIZE
	Low Heat and High Heat
0-2,000	36
2,000	37
3,000	38
4,000	38
5,000	39
6,000	40
7,000	41
8,000	41
9,000	42
10,000	43

ACCESSORY/FIOP STATIC PRESSURE (in. wg)* — 48/50HJ015-025

COMPONENT	CFM								
	4500	5000	5400	6000	7200	7500	9000	10,000	11,250
Economizer	0.040	0.050	0.060	0.070	0.090	0.100	0.110	0.120	0.140
MoistureMi$er Dehumidification Package	0.045	0.048	0.060	0.071	0.103	0.111	0.160	0.197	0.250

LEGEND

FIOP — Factory-Installed Option

*The static pressure must be added to external static pressure. The sum and the evaporator entering-air cfm should then be used in conjunction with the Fan Performance tables to determine blower rpm and watts.

ACCESSORY/FIOP STATIC PRESSURE (in. wg) — 50HJ015-025 UNITS

UNIT 50HJ	HEATER RATED VOLTAGE*	CFM	ELECTRIC HEATERS PRESSURE DROP (kW)			ECONOMIZER PRESSURE DROP
015, 017	208/240-3-60	3,750	0.05 (14/19, 26/34)	0.06 (42/56)	0.07 (56/75)	0.03
		4,000	0.05 (14/19, 26/34)	0.06 (42/56)	0.07 (56/75)	0.04
		5,000	0.07 (14/19, 26/34)	0.08 (42/56)	0.10 (56/75)	0.05
		6,000	0.09 (14/19, 26/34)	0.12 (42/56)	0.15 (56/75)	0.07
		7,200	0.11 (14/19, 26/34)	0.16 (42/56)	0.20 (56/75)	0.09
		7,500	0.12 (14/19, 26/34)	0.17 (42/56)	0.21 (56/75)	0.10
	480-3-60	3,750	0.05 (15, 32)	0.06 (55)	0.07 (80)	0.03
		4,000	0.05 (15, 32)	0.06 (55)	0.07 (80)	0.04
		5,000	0.07 (15, 32)	0.08 (55)	0.10 (80)	0.05
		6,000	0.09 (15, 32)	0.12 (55)	0.15 (80)	0.07
		7,200	0.11 (15, 32)	0.15 (55)	0.20 (80)	0.09
		7,500	0.12 (15, 32)	0.17 (55)	0.21 (80)	0.10
	575-3-60	3,750	0.06 (37)			0.03
		4,000	0.06 (37)			0.03
		5,000	0.08 (37)			0.05
		6,000	0.12 (37)			0.07
		7,200	0.15 (37)			0.09
		7,500	0.17 (37)			0.10
025	208/240-3-60	5,000	0.08 (26/34)	0.11 (42/56)	0.14 (56/75)	0.06
		6,000	0.09 (26/34)	0.12 (42/56)	0.15 (56/75)	0.07
		7,200	0.11 (26/34)	0.16 (42/56)	0.20 (56/75)	0.09
		9,000	0.15 (26/34)	0.19 (42/56)	0.24 (56/75)	0.11
		10,000	0.17 (26/34)	0.21 (42/56)	0.26 (56/75)	0.12
		11,250	0.20 (26/34)	0.24 (42/56)	0.29 (56/75)	0.14
	480-3-60	5,000	0.08 (32)	0.11 (55)	0.14 (80)	0.06
		6,000	0.09 (32)	0.12 (55)	0.15 (80)	0.07
		7,200	0.11 (32)	0.15 (55)	0.20 (80)	0.09
		9,000	0.15 (32)	0.19 (55)	0.24 (80)	0.11
		10,000	0.17 (32)	0.21 (55)	0.26 (80)	0.12
		11,250	0.20 (32)	0.24 (55)	0.29 (80)	0.14

LEGEND

FIOP — Factory-Installed Option

*There are no electric heaters available for 017 and 025 575-v units.

NOTES:

1. Heaters are rated at 240 v, 480 v, and 575 v.
2. The factory assembled horizontal adapter substantially improves fan performance.
3. The static pressure must be added to external static pressure. The sum and the evaporator entering-air cfm should then be used in conjunction with the Fan Performance table to determine blower rpm, bhp, and watts.

Performance data (cont)

FAN RPM AT MOTOR PULLEY SETTINGS*

48/50HJ	0	0.5	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6
015 (208/230, 460 v)†	††	††	††	††	1064	1035	1006	978	949	920	891	863	834
015 (208/230, 460 v)**	††	††	††	††	1426	1393	1360	1327	1294	1261	1227	1194	1161
015 (575 v)†	††	††	††	††	1321	1294	1267	1240	1213	1186	1159	1132	1105
017†	††	††	††	††	1021	1002	984	965	947	928	910	891	873
017**	††	††	††	††	1200	1178	1156	1134	1112	1091	1069	1047	1025
025†	††	††	††	††	1151	1132	1114	1095	1077	1058	1040	1021	1002
025**	††	††	††	††	1369	1347	1325	1303	1281	1259	1237	1215	1193

*Approximate fan rpm shown.
†Indicates standard drive package.
**Indicates alternate drive package.
††Due to belt and pulley style, pulley cannot be set to this number of turns open.

EVAPORATOR FAN MOTOR SPECIFICATIONS

UNIT 48/50HJ	NOMINAL HP	VOLTAGE	MAX WATTS	EFF. %	MAX BHP	MAX BkW	MAX AMPS
015 (Standard Motor)	2.9	208	2700	85.8	3.13	2.34	9.46
	2.9	230	2700	85.8	3.13	2.34	8.6
	2.9	460	2700	85.8	3.13	2.34	4.3
	3	575	3065	81.7	3.38	2.53	3.9
015 (Optional Motor)	3.7	208	3775	85.8	4.38	3.27	10.5
	3.7	230	3775	85.8	4.38	3.27	10.5
	3.7	460	3775	85.8	4.38	3.27	4.8
017	5	208	5180	87.5	6.13	4.57	15.8
	5	230	5180	87.5	6.13	4.57	15.8
	5	460	5180	87.5	6.13	4.57	7.9
	5	575	5180	87.5	6.13	4.57	6.0
025	7.5	208	7915	88.5	9.47	7.06	22
	7.5	230	8640	88.5	10.33	7.71	22
	7.5	460	8640	88.5	10.33	7.71	13
	7.5	575	7915	88.5	9.47	7.06	10

LEGEND

BHP — Brake Horsepower
BkW — Brake Kilowatts

EVAPORATOR-FAN MOTOR EFFICIENCY

MOTOR HORSEPOWER	MOTOR EFFICIENCY (%)
3.0	81.7
2.9, 3.7	85.8
5.0	87.5
7.5	88.5

NOTE: All indoor-fan motors 5 hp and larger meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT) effective October 24, 1997.

Electrical data

ELECTRICAL DATA — 48HJ015-025

UNIT 48HJ	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		OFM			IFM		POWER EXHAUST		COMBUSTION FAN MOTOR	POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	FLA	MCA	MOCP*
015 (Standard IFM)	208/230	187	253	20.7	156	19.3	123	3	0.5	1.7	2.9	8.8/ 8.4	—	—	0.57	59/59	70/70
													4.6	18.8	0.57	64/63	80/80
	460	414	508	10	70	10	62	3	0.5	0.8	2.9	4.2	—	—	0.30	29	35
													2.3	6.0	0.30	31	40
	575	518	633	8.2	54.0	7.9	50	3	0.5	0.8	3.0	3.9	—	—	0.57	24	30
													2.1	4.8	0.57	26	30
015 (Optional IFM)	208/230	187	253	20.7	156	19.3	123	3	0.5	1.7	3.7	11.0/10.5	—	—	0.57	61/61	80/80
													4.6	18.8	0.57	66/65	80/80
	460	414	508	10	70	10	62	3	0.5	0.8	3.7	4.8	—	—	0.30	30	35
													2.3	6.0	0.30	32	40
017	208/230	187	253	32.1	195	20.7	156	3	0.5	1.7	5.0	15.8/15.8	—	—	0.57	82/82	110/110
													4.6	18.8	0.57	86/86	110/110
	460	414	508	16.4	95	10	70	3	0.5	0.8	5.0	7.9	—	—	0.30	41	50
													2.3	6.0	0.30	43	50
	575	518	633	12	80	8.2	54	3	0.5	0.75	5.0	6.0	—	—	0.57	31	40
													2.1	4.8	0.57	34	40
025	208/230	187	253	42	239	33.6	225	2	1	6.6	7.5	25.0/25.0	—	—	0.57	124/124	150/150
													4.6	18.8	0.57	129/129	150/150
	460	414	508	19.2	125	17.3	114	2	1	3.3	7.5	13.0	—	—	0.30	61	80
													2.3	6.0	0.30	63	80
	575	518	633	13.8	80	13.5	80	2	1	3.4	7.5	10.0	—	—	0.57	48	60
													2.1	4.8	0.57	50	60

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

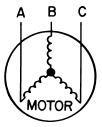
*Fuse or HACR circuit breaker.

NOTES:
1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

   % Voltage Imbalance

   $$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage.

(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457}$$

$$= 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Electrical data (cont)

ELECTRICAL DATA — 50HJ015-025

UNIT 48HJ	NOMINAL VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMPRESSOR No. 1		COMPRESSOR No. 2		OFM			IFM		POWER EXHAUST		ELECTRIC HEAT*		POWER SUPPLY	
		Min	Max	RLA	LRA	RLA	LRA	Qty	Hp	FLA (ea)	Hp	FLA	FLA	LRA	kW	FLA	MCA	MOCP†
015 (Standard IFM)	208/230	187	253	20.7	156	19.3	123	3	0.5	1.7	2.9	8.8/ 8.4	— 4.6	— 18.8	— —	— —	59/ 59 64/ 63	70/ 70 80/ 80
													— 4.6	— 18.8	14/19 14/19	39/ 45 39/ 45	60/ 67 66/ 73	70/ 70 80/ 80
													— 4.6	— 18.8	26/34 26/34	71/ 82 71/ 82	100/113 106/119	100/125 110/125
													— 4.6	— 18.8	42/56** 42/56**	117/135 117/135	157/146 163/151	175/175 175/175
	460	414	508	10	70	10	62	3	0.5	0.8	2.9	4.2	— 2.3	— 6.0	— —	— —	29 31	35 40
													— 2.3	— 6.0	15 15	18 18	29 31	35 40
													— 2.3	— 6.0	32 32	39 39	54 57	60 60
													— 2.3	— 6.0	55** 55**	66 66	71 74	80 80
	575	518	633	8.2	54	7.9	50	3	0.5	0.75	3.0	3.9	— 2.1	— 4.8	— —	— —	24 26	30 30
													— 2.1	— 4.8	37** 37**	37 37	51 54	60 60
015 (Optional IFM)	208/230	187	253	20.7	156	19.3	123	3	0.5	1.7	3.7	11.0/ 10.5	— 4.6	— 18.8	— —	— —	61/ 61 65/ 66	80/ 80 80/ 80
													— 4.6	— 18.8	14/19 14/19	39/ 45 39/ 45	62/ 70 68/ 76	80/ 80 80/ 80
													— 4.6	— 18.8	26/34 26/34	71/ 82 71/ 82	102/116 108/122	110/125 110/125
													— 4.6	— 18.8	42/56** 42/56**	117/135 117/135	159/149 165/155	175/175 175/175
	460	414	508	10	70	10	62	3	0.5	0.8	3.7	4.8	— 2.3	— 6.0	— —	— —	30 32	35 40
													— 2.3	— 6.0	15 15	18 18	30 32	35 40
													— 2.3	— 6.0	32 32	39 39	55 58	60 60
													— 2.3	— 6.0	55** 55**	66 66	72 75	80 80
017	208/230	187	253	32.1	195	20.7	156	3	0.5	1.7	5.0	15.8/ 15.8	— 4.6	— 18.8	— —	— —	82/ 82 86/ 86	110/110 110/110
													— 4.6	— 18.8	26/34 26/34	71/ 82 71/ 82	109/122 114/128	110/125 125/150
													— 4.6	— 18.8	42/56 42/56	117/135 117/135	166/155 172/161	175/175 175/175
													— 4.6	— 18.8	56/75** 56/75**	156/180 156/180	176/200 182/206	200/225 200/225
	460	414	508	16.4	95	10	70	3	0.5	0.8	5.0	7.9	— 2.3	— 6.0	— —	— —	41 43	50 50
													— 2.3	— 6.0	32 32	39 39	59 62	60 70
													— 2.3	— 6.0	55 55	66 66	76 79	90 90
													— 2.3	— 6.0	80** 80**	96 96	106 109	125 125
	575	518	633	12	80	8.2	54	3	0.5	0.75	5.0	6.0	— 2.1	— 4.8	— —	— —	31 34	40 40
025	208/230	187	253	42	239	33.6	225	2	1	6.6	7.5	25.0/ 25.0	— 4.6	— 18.8	— —	— —	124/124 129/129	150/150 150/150
													— 4.6	— 18.8	26/34 26/34	71/ 82 71/ 82	124/134 129/140	150/150 150/150
													— 4.6	— 18.8	42/56 42/56	117/135 117/135	178/166 183/172	200/175 200/175
													— 4.6	— 18.8	56/75** 56/75**	156/180 156/180	187/211 193/217	200/225 200/225
	460	414	508	19.2	125	17.3	114	2	1	3.3	7.5	13.0	— 2.3	— 6.0	— —	— —	61 63	80 80
													— 2.3	— 6.0	32 32	39 39	65 68	80 80
													— 2.3	— 6.0	55 55	66 66	82 85	90 90
													— 2.3	— 6.0	80** 80**	96 96	112 115	125 125
	575	518	633	13.8	80	13.5	80	2	1	3.4	7.5	10.0	— 2.1	— 4.8	— —	— —	48 50	60 60

(See Legend on page 47.)

LEGEND

FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
NEC — National Electrical Code
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Heater capacity (kW) is based on heater voltage of 240 v, 480 v, and 575 v. Heaters are rated at 240 v, 480 v, or 575 v. If power distribution voltage to unit varies from rated heater voltage, heater kW will vary accordingly. To determine heater capacity at actual unit voltage, multiply 240 v, 480 v, or 575 v capacity by multipliers found in table on page 6.

†Fuse or HACR circuit breaker.

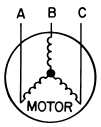
**Heaters are field-installed only.

NOTES:

1. In compliance with NEC requirements for multimotor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. The Canadian units may be fuse or circuit breaker.
2. **Unbalanced 3-Phase Supply Voltage**
   Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent of voltage imbalance.

   $$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

   Example: Supply voltage is 460-3-60.



AB = 452 v
BC = 464 v
AC = 455 v

$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

Determine maximum deviation from average voltage.

(AB) 457 – 452 = 5 v
(BC) 464 – 457 = 7 v
(AC) 457 – 455 = 2 v

Maximum deviation is 7 v.

Determine percent of voltage imbalance.

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457}$$

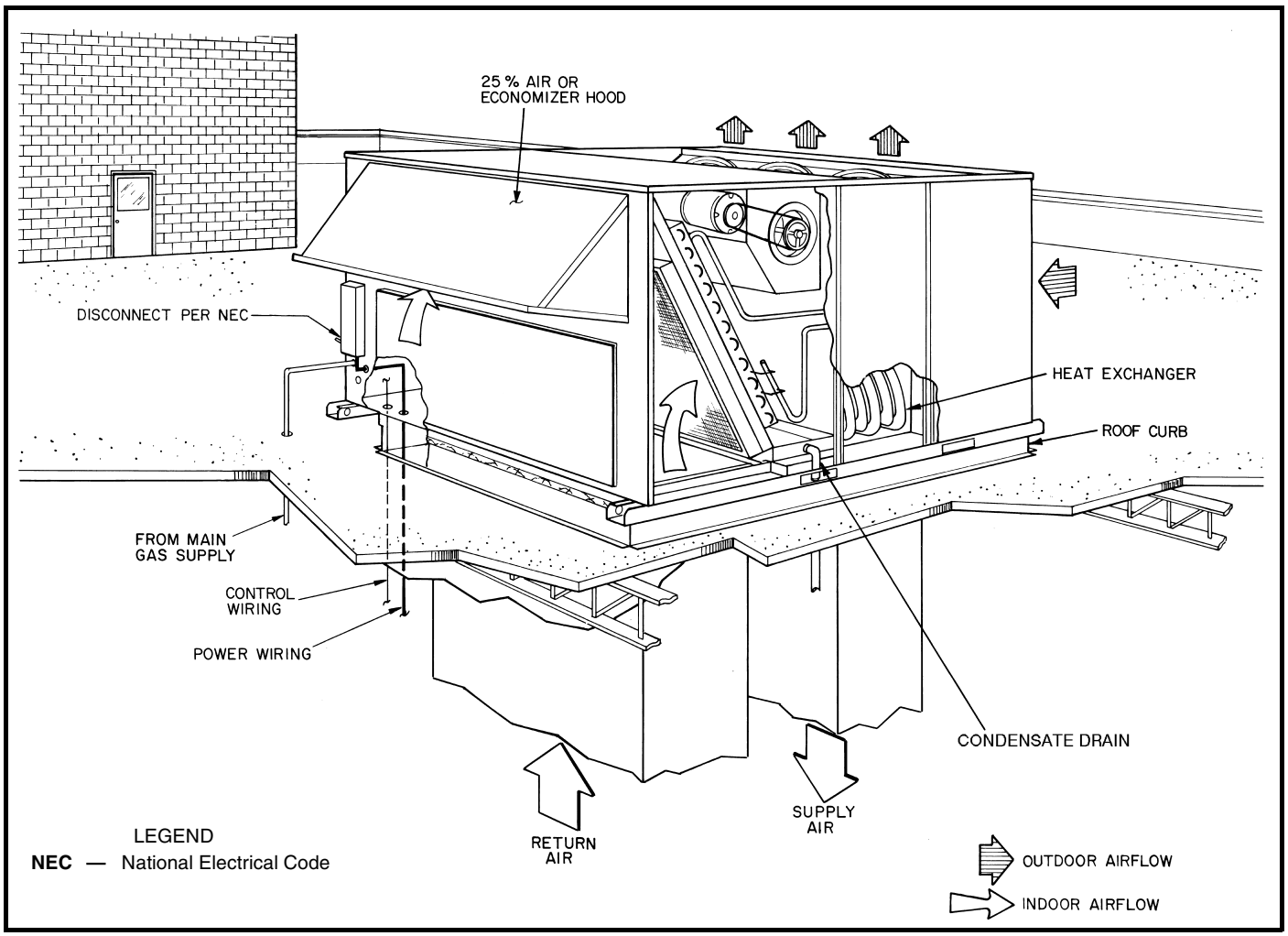
$$= 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

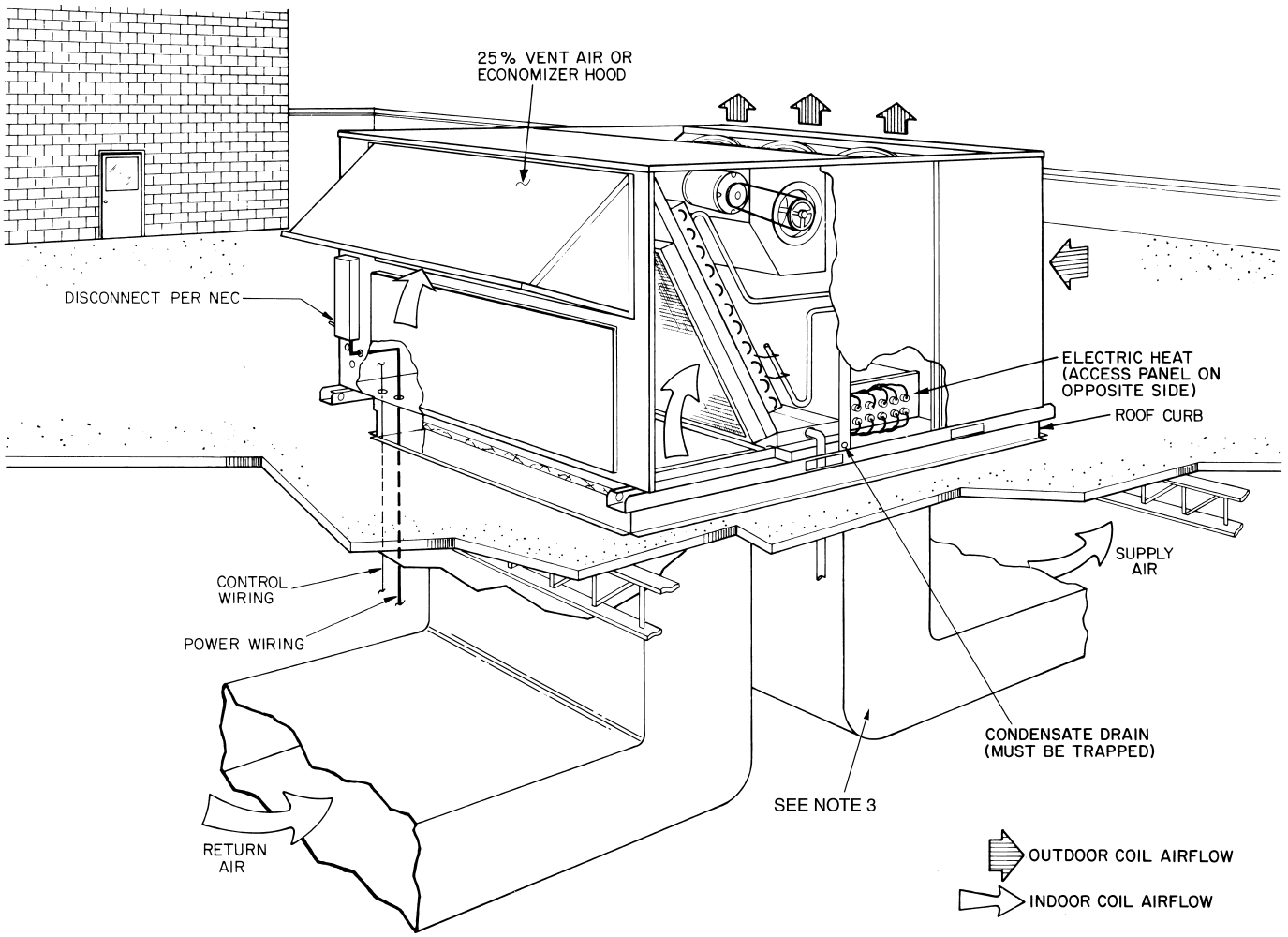
IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

3. MCA calculation for 50HJ015-025 units with electric heaters over 50 kW = (1.25 x IFM amps) + (1.00 x heater FLA).

Typical piping and wiring — 48HJ015-025 (48HJ015 shown)



Typical piping and wiring — 50HJ015-025 (50HJ015 shown)

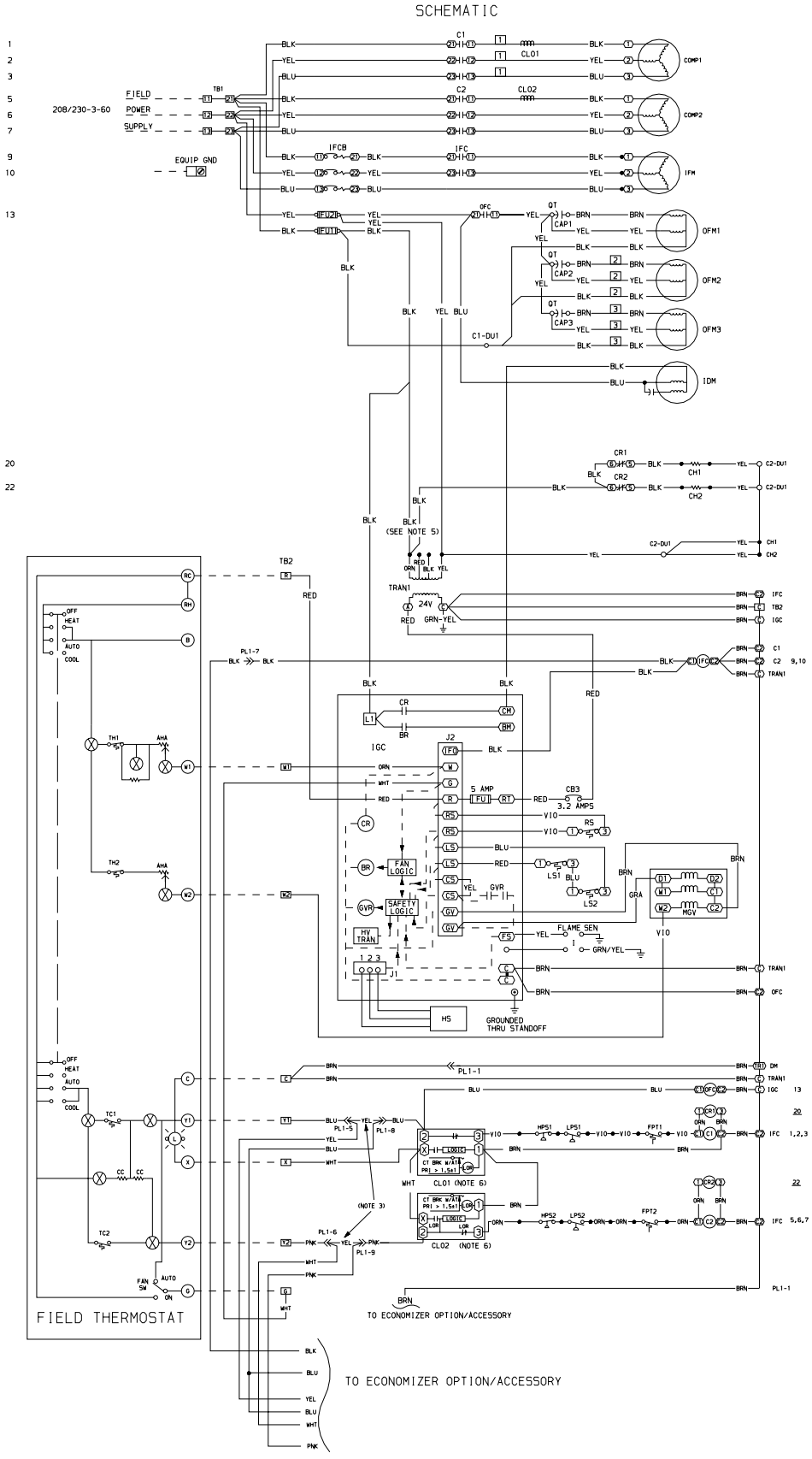


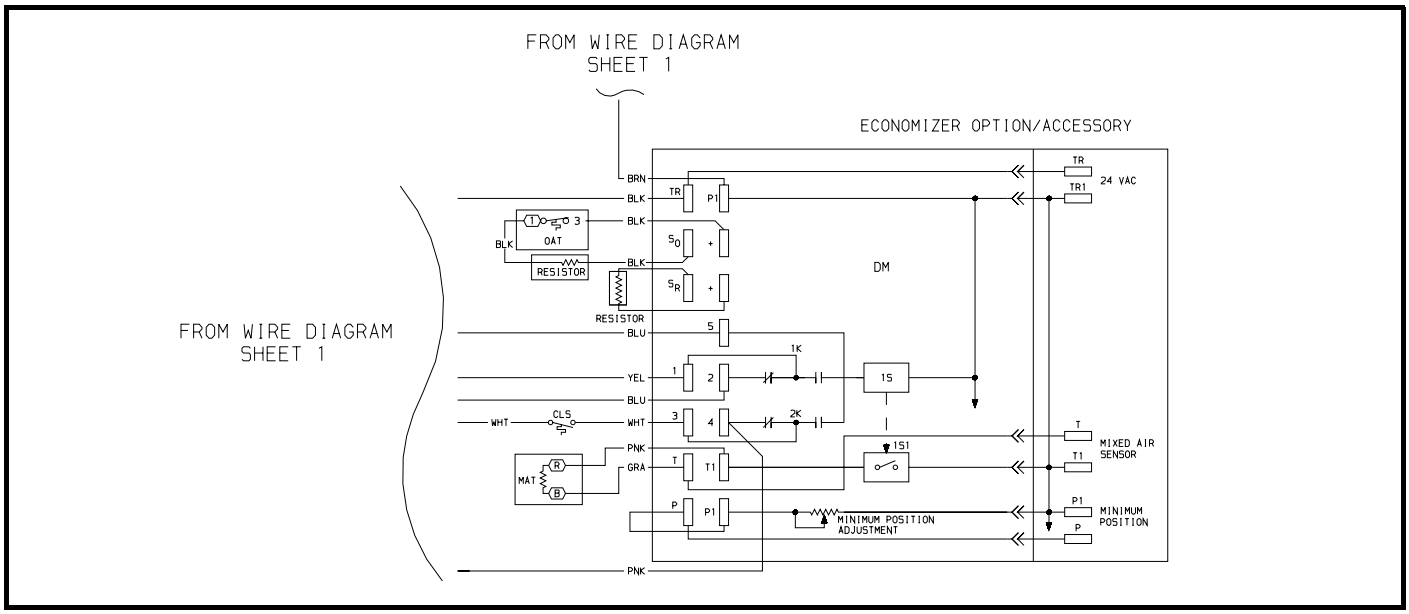
LEGEND

NEC — National Electrical Code

NOTES:
1. Illustration shown is a general guide only and is not intended to include all details for any specific installation.
2. Installation must comply with all applicable codes.
3. A 90-degree elbow **must** be installed on the supply duct connection for units equipped with electric heat.

Typical wiring schematic (48HJ017, 208/230 v shown)





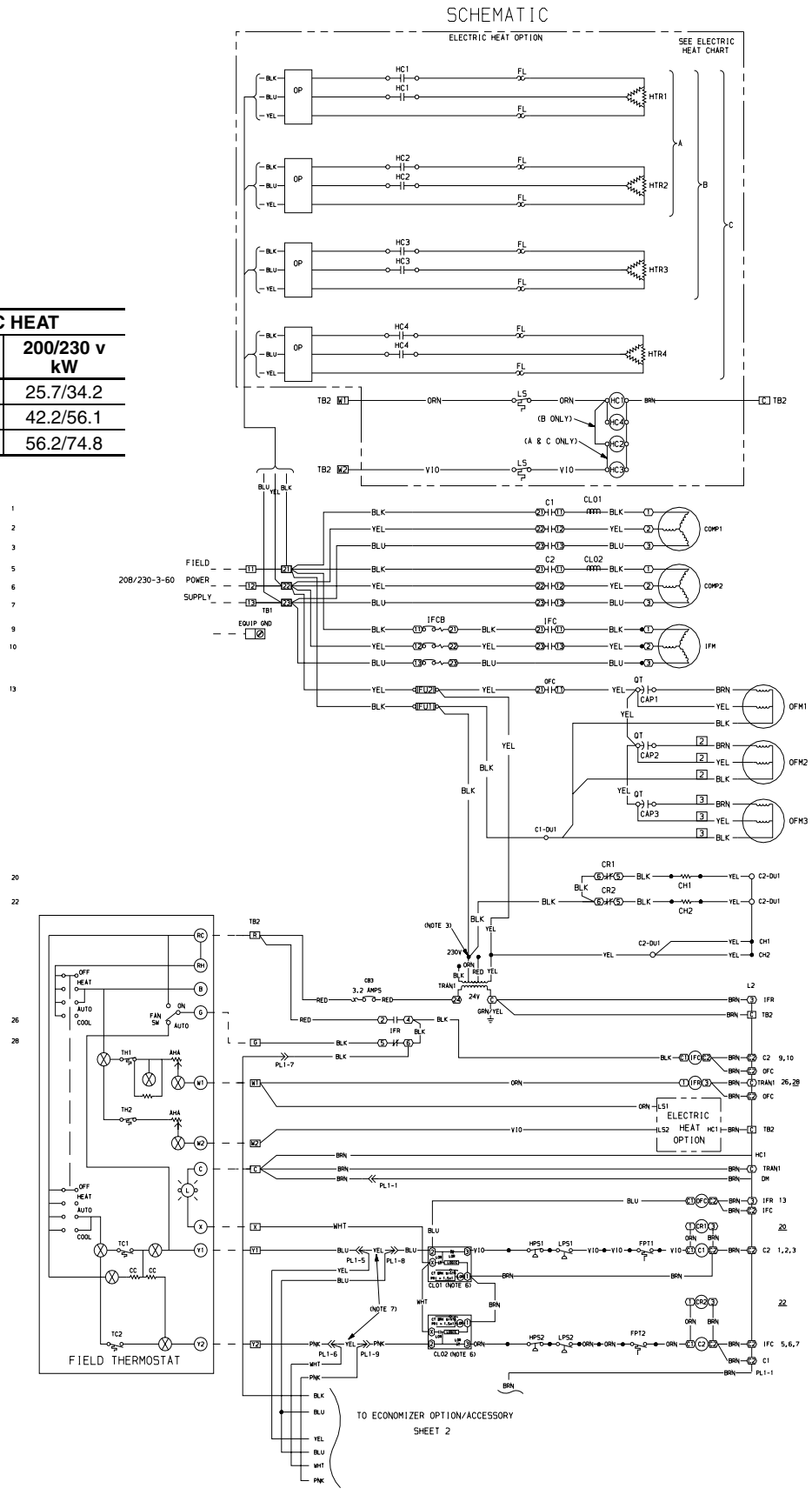
LEGEND

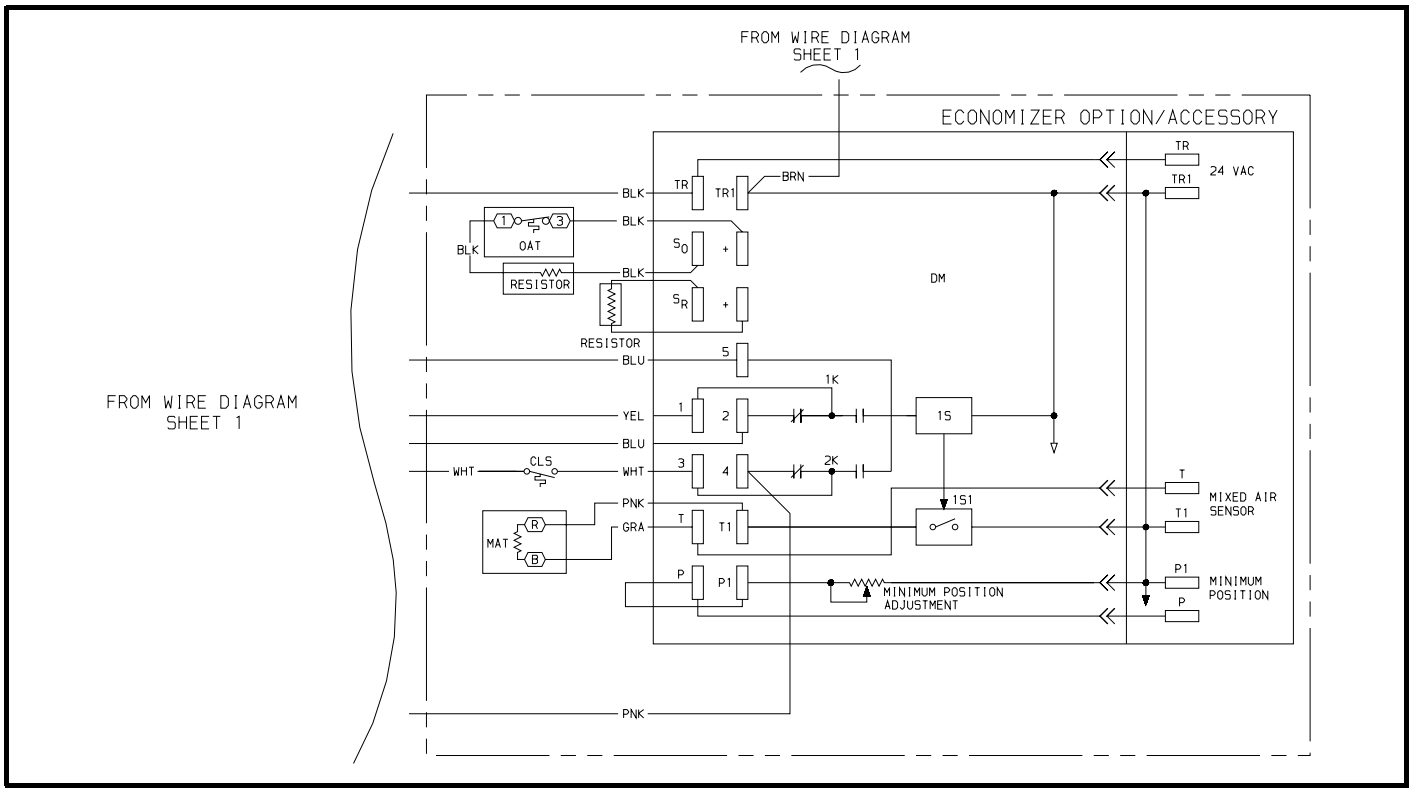
AHA — Adjustable Heat Anticipator
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
CH — Crankcase Heater
CLO — Compressor Lockout
CLS — Compressor Lockout Switch
COMP — Compressor Motor
CR — Control Relay
CT — Current Transformer
DM — Damper Motor
DU — Dummy Terminal
EAS — Economizer Actuator Auxiliary Switch
EC — Enthalpy Control
EMC — Economizer Motor Contactor
EQUIP — Equipment
FPT — Freeze Protection Thermostat
FU — Fuse
GND — Ground
HPS — High-Pressure Switch
HS — Hall Effect Sensor
HV — High Voltage
I — Ignitor
IDM — Induced-Draft Motor
IFC — Indoor-Fan Contactor
IFCB — Indoor-Fan Circuit Breaker
IFM — Indoor-Fan Motor
IGC — Integrated Gas Unit Controller
L — Light
LOR — Lockout Relay
LPS — Low-Pressure Switch
LS — Limit Switch
MAT — Mixed-Air Thermostat
MGV — Main Gas Valve
OAT — Outdoor-Air Thermostat
OFC — Outdoor-Fan Contactor
OFM — Outdoor-Fan Motor
PL — Plug Assembly
PRI — Primary
QT — Quadruple Terminal
R — Relay
RS — Rollout Switch
SW — Switch
TB — Terminal Block
TC — Thermostat Cooling
TDR — Time Delay Relay
TH — Thermostat Heating
TRAN — Transformer
Terminal (Marked)
Terminal (Unmarked)
Terminal Block
Splice
Factory Wiring
Field Wiring
Option/Accessory Wiring
To Indicate Common Potential Only, Not To Represent Wiring

NOTES:
1. Compressor and/or fan motor(s) thermally protected; 3-phase motors protected against primary single-phasing conditions.
2. If any of the original wire furnished must be replaced, it must be replaced with type 90° C or its equivalent.
3. Jumpers are omitted when unit is equipped with economizer.
4. IFCB must trip amps is equal to or less than 140% FLA (Full Load Amps).
5. On 208/230 v unit TRAN1 is factory wired to ORN lead for 230 v power supply. If unit is to run on 208 v power supply TRAN1 must be rewired as follows: Disconnect the BLK wire on TRAN1 and connect it to 208 v red wire and insulate 230 v ORN wire.
6. The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices; before replacing CLO, check these devices.
7. Number(s) indicates the line location of used contacts. A bracket over (2) numbers signifies a single pole, double throw contact. An underlined number signifies a normally closed contact. Plain (no line) number signifies a normally open contact.

Typical wiring schematic (50HJ017, 208/230 v shown)

ELECTRIC HEAT		
	208/240 v Amps	200/230 v kW
A	71.3/82.3	25.7/34.2
B	117/135	42.2/56.1
C	156/180	56.2/74.8





LEGEND

AHA	—	Adjustable Heat Anticipator
BKR W/AT	—	Breaks with Amp Turns
C	—	Contactor, Compressor
CAP	—	Capacitor
CB	—	Circuit Breaker
CC	—	Cooling Compensator
CH	—	Crankcase Heater
CLO	—	Compressor Lockout
CLS	—	Compressor Lockout Switch
COMP	—	Compressor Motor
CR	—	Control Relay
CT	—	Current Transformer
DM	—	Damper Motor
DU	—	Dummy Terminal
EAS	—	Economizer Actuator Auxiliary Switch
EMC	—	Economizer Motor Contactor
EQUIP	—	Equipment
FL	—	Fuse Link
FPT	—	Freeze Protection Thermostat
FU	—	Fuse
GND	—	Ground
HC	—	Heater Contactor
HPS	—	High-Pressure Switch
HTR	—	Heater
IFC	—	Indoor-Fan Contactor
IFCB	—	Indoor-Fan Circuit Breaker
IFM	—	Indoor-Fan Motor
IFR	—	Indoor-Fan Relay
IP	—	Internal Protector
L	—	Light
LOR	—	Lockout Relay
LPS	—	Low-Pressure Switch
LS	—	Limit Switch
MAT	—	Mixed-Air Thermostat
OAT	—	Outdoor-Air Thermostat
OFC	—	Outdoor-Fan Contactor
OFM	—	Outdoor-Fan Motor
OP	—	Overcurrent Protector
PL	—	Plug Assembly
PRI	—	Primary
QT	—	Quadruple Terminal
SR	—	Solenoid Relay
SW	—	Switch
TB	—	Terminal Block
TC	—	Thermostat Cooling
TDR	—	Time Delay Relay
TH	—	Thermostat Heating
TRAN	—	Transformer

Terminal (Marked)

Terminal (Unmarked)

Terminal Block

Splice

Factory Wiring

Field Wiring

Option/Accessory Wiring

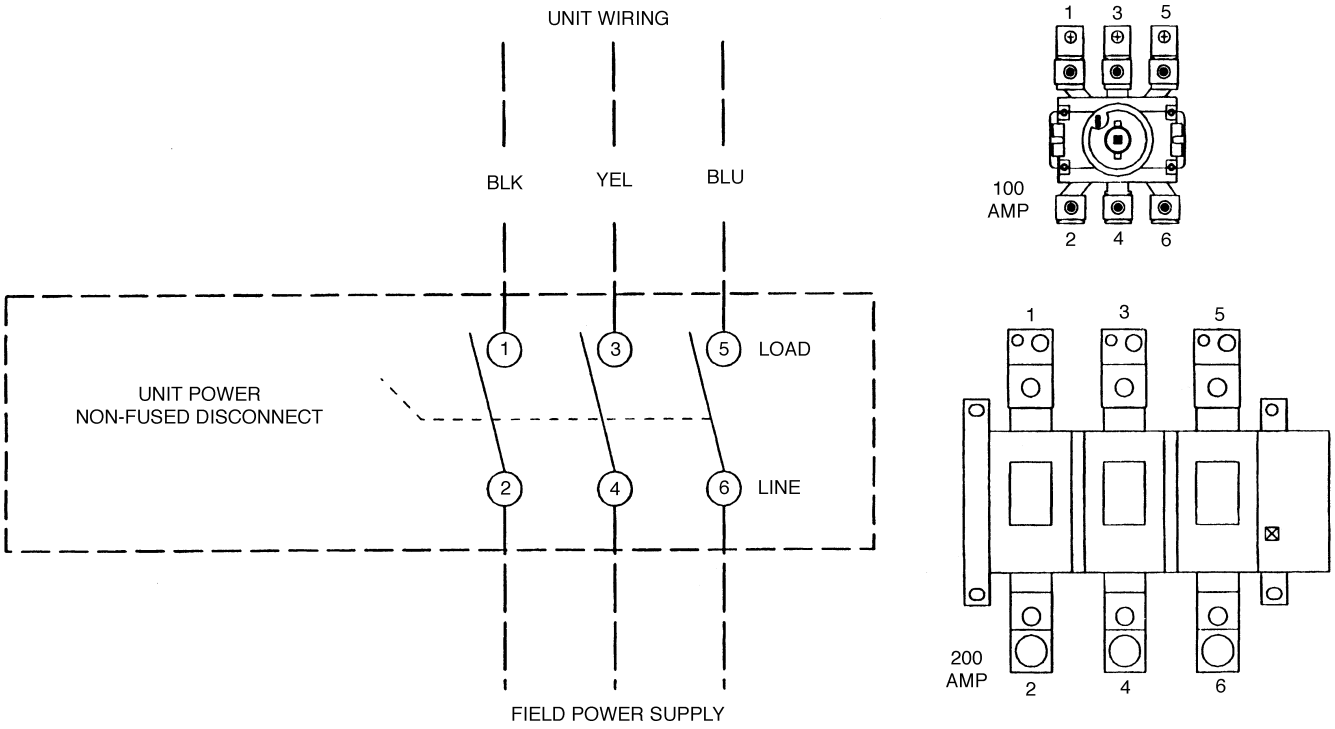
To Indicate Common Potential Only, Not To Represent Wiring

NOTES:

1. Compressor and/or fan motor(s) thermally protected; 3-phase motors protected against primary single-phasing conditions.
2. If any of the original wire furnished must be replaced, it must be replaced with type 90° C or its equivalent.
3. TRAN1 is wired for 230 v operation. If unit is 208 v, disconnect the black wires from the ORN TRAN wire and reconnect to the red TRAN wire, apply wirenuts to wires.
4. IFCB must trip amps is equal to or less than 140% FLA (Full Load Amps).
5. The CLO locks out the compressor to prevent short cycling on compressor overload and safety devices; before replacing CLO, check these devices.
6. Jumpers are omitted when unit is equipped with economizer.
7. Number(s) indicates the line location of used contacts. A bracket over (2) numbers signifies a single-pole, double-throw contact. An underlined number signifies a normally closed contact. Plain (no line) number signifies a normally open contact.

Typical wiring schematic (50HJ017, 208/230 v shown) (cont)

NON-FUSED DISCONNECT



NOTES:
1. If the non-fused disconnect Service Option is ordered for size 015-025 units, the Non-Fused Disconnect will be factory-installed.
2. The Disconnect takes the place of TB-1 as shown on the unit wiring diagram label and the component arrangement label.

Operating sequence

Cooling, units without economizer — When thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan contactor (IFC) and compressor contactor no. 1 (C1) are energized, and evaporator-fan motor (IFM), compressor no. 1 and condenser fan(s) start. The condenser-fan motor(s) runs continuously while unit is cooling. When the thermostat calls for a second stage of cooling by energizing Y2, compressor contactor no. 2 (C2) is energized and compressor no. 2 starts.

Heating, units without economizer (48HJ015-025)

NOTE: The 48HJ015-025 units have 2 stages of heat.

When the thermostat calls for heating, power is sent to Won the IGC (integrated gas unit controller) board. An LED (light-emitting diode) on the IGC board will be on during normal operation. A check is made to ensure that the rollout switch and limit switch are closed. The induced-draft motor is then energized, and when speed is proven with the hall effect sensor on the motor, the ignition activation period begins. The burners will ignite within 5 seconds.

If the burners do not light, there is a 22-second delay before another 5-second attempt. If the burners still do not light, this sequence is repeated for 15 minutes. After the 15 minutes have elapsed, if the burners still have not lighted, heating is locked out. To reset the control, break 24-v power to the thermostat.

When ignition occurs the IGC board will continue to monitor the condition of the rollout and limit switches, the hall effect sensor, as well as the flame sensor. If the unit is controlled through a room thermostat set for fan auto., 45 seconds after ignition occurs, the indoor-fan motor will be energized. If for some reason the overtemperature limit opens prior to the start of the indoor fan blower, on the next attempt, the 45-second delay will be shortened to 5 seconds less than the time from initiation of heat to when the limit tripped. Gas will not be interrupted to the burners and heating will continue. Once modified, the fan on delay will not change back to 45 seconds unless power is reset to the control.

When additional heat is required, W2 closes and initiates power to the second stage of the main gas valve. When the thermostat is satisfied, W1 and W2 open and the gas valve closes, interrupting the flow of gas to the main burners. If the call for W1 lasted less than 1 minute, the heating cycle will not terminate until 1 minute after W1 became active. If the unit is controlled through a room thermostat set for fan auto., the indoor-fan motor will continue to operate for an additional 45 seconds then stop. If the overtemperature limit opens after the indoor motor is stopped within 10 minutes of W1 becoming inactive, on the next cycle the time will be extended by 15 seconds. The maximum delay is 3 minutes. Once modified, the fan off delay will not change back to 45 seconds unless power is reset to the control.

A LED indicator is provided on the IGC to monitor operation. The IGC is located by removing the side panel and viewing the IGC through the view port located in the control box access panel. During normal operation, the LED is continuously on.

Heating, units without economizer (50HJ015-025, if accessory or optional heater is installed) — Upon a call for heating through terminal W1, IFC and heater contactor no. 1 (HC1) are energized. On units equipped for 2 stages of heat, when additional heat is needed, HC2 is energized through W2.

Cooling, units with economizer — Upon a call for cooling, when outdoor ambient is above the temperature control setting, the economizer damper moves to VENT position. The compressors and evaporator and condenser fans energize.

Upon a first call for cooling, when outdoor ambient is below the temperature control setting (factory default 75 ± 2 F), the evaporator fan starts and the economizer opens to maintain 53 F leaving-air temperature. The compressors remain off.

Upon a second-stage call for cooling, compressor no. 1 is energized and mechanical cooling is integrated with economizer cooling. If the outdoor-air temperature drops below 50 F, a cooling lockout switch prevents the compressors from running.

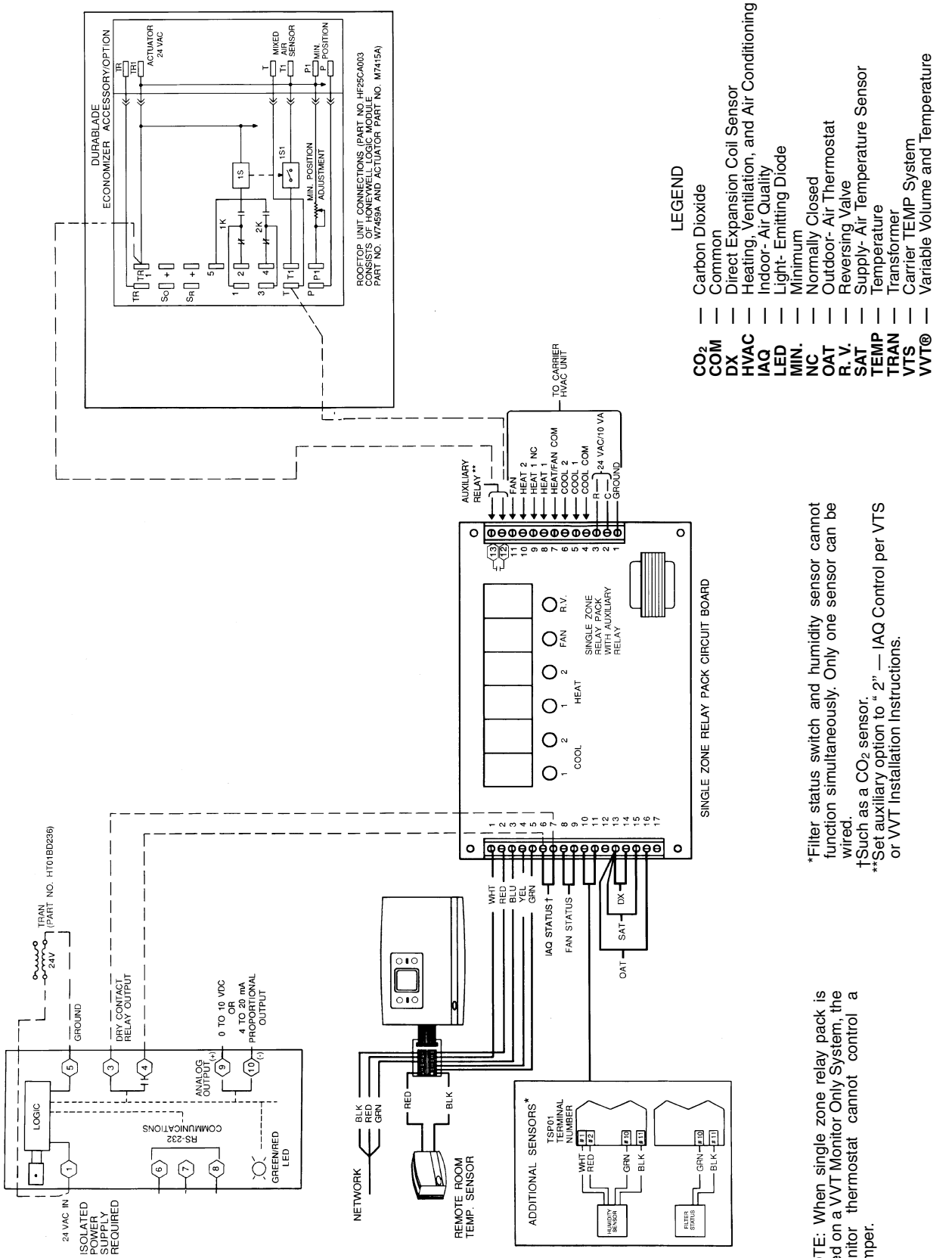
NOTE: In the economizer mode only, compressor no. 1 is capable of operating and compressor no. 2 is locked out.

When supply-air temperature drops below a fixed set point, the economizer damper modulates to maintain the temperature at the fixed set point.

Freeze protection thermostats (FPT) are located on the evaporator coil. They detect frost build-up and turn the compressors off locking them out and requiring a manual reset. Once frost has melted, the compressors can be reenergized.

Heating, units with economizer — Outdoor-air damper stays at VENT position while evaporator fan is operating. Refer to Heating, Units Without Economizer (48HJ015-025) and Heating, Units Without Economizer (50HJ015-025, If Accessory or Optional Heater is Installed) sections on this page for remainder of operating sequence.

INDOOR- AIR QUALITY AND APOLLO CONTROLS WIRING



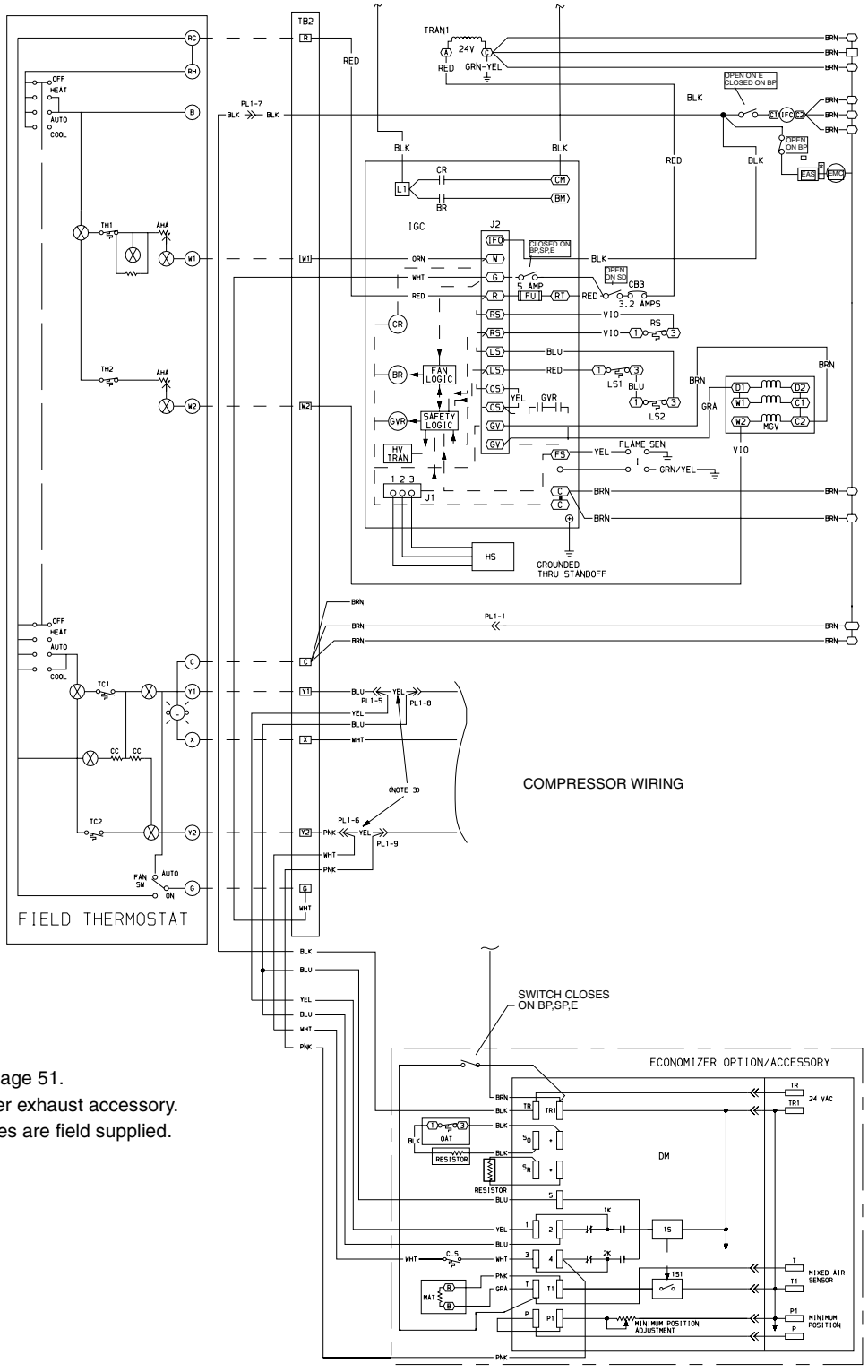
LEGEND

CO_2	— Carbon Dioxide
COM	— Common
DX	— Direct Expansion Coil Sensor
HVAC	— Heating, Ventilation, and Air Conditioning
IAQ	— Indoor- Air Quality
LED	— Light- Emitting Diode
MIN.	— Minimum
NC	— Normally Closed
OAT	— Outdoor- Air Thermostat
R.V.	— Reversing Valve
SAT	— Supply- Air Temperature Sensor
TEMP	— Temperature
TRAN	— Transformer
VTS	— Carrier TEMP System
VVT®	— Variable Volume and Temperature

*Filter status switch and humidity sensor cannot function simultaneously. Only one sensor can be wired.
†Such as a CO_2 sensor.
**Set auxiliary option to " 2" — IAQ Control per VTS or VVT Installation Instructions.

NOTE: When single zone relay pack is used on a VVT Monitor Only System, the monitor thermostat cannot control a damper.

TYPICAL SMOKE CONTROL/FIRE SHUTDOWN WIRING — 48HJ015-025



See Legend on page 51.

*Included in power exhaust accessory.

NOTE: All switches are field supplied.

OPERATING MODES

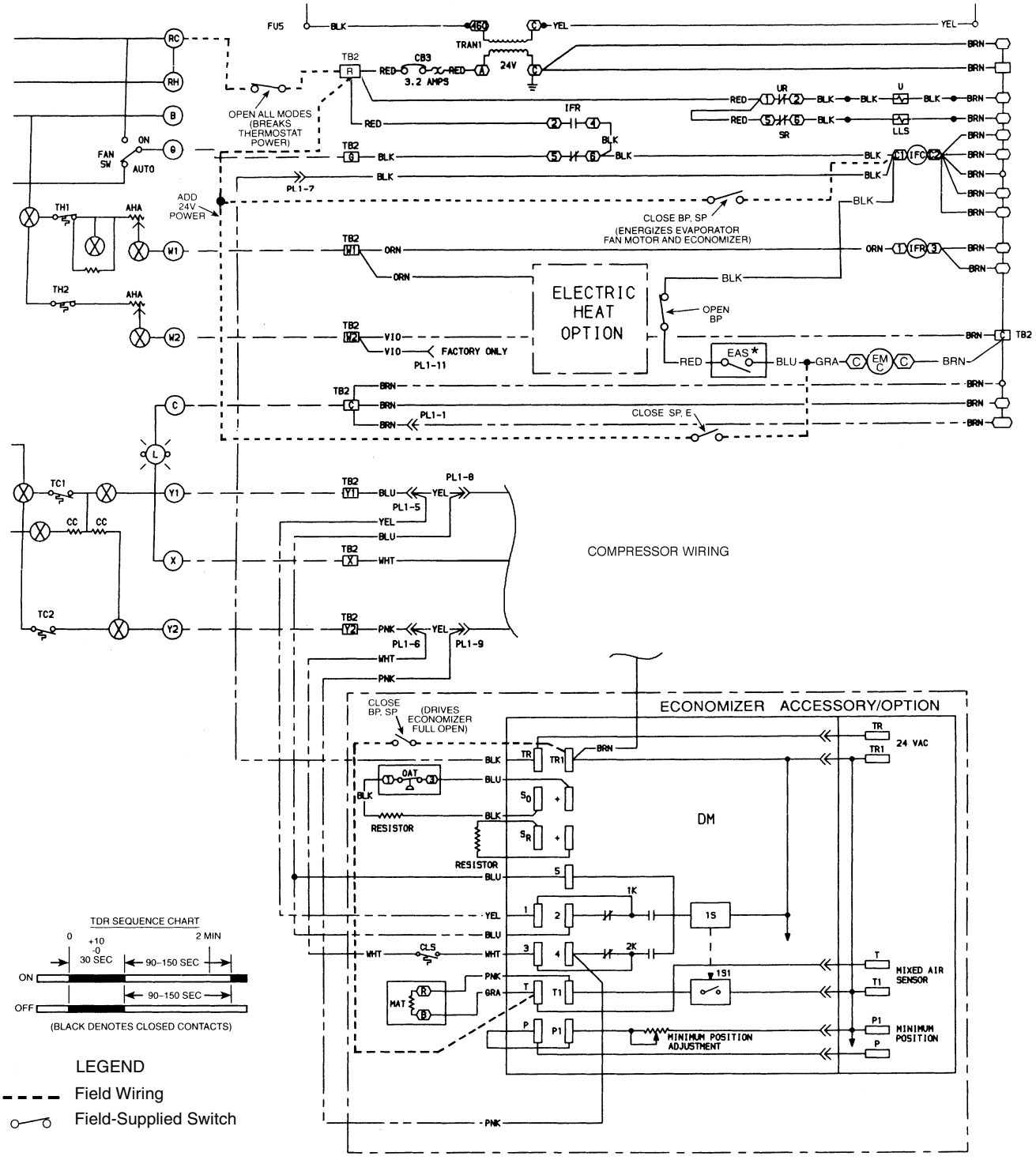
BP — Building Pressurization: Evaporator fan on, economizer energized to fully open position, power exhaust disabled.

E — Evacuation: Evaporator fan off, economizer energized to fully open position, power exhaust on (open).

SD — Complete Unit Shutdown: Breaks 24-v power to the thermostat.

SP — Smoke Purge: Evaporator fan on, economizer energized to fully open position, power exhaust on.

TYPICAL SMOKE CONTROL/FIRE SHUTDOWN WIRING — 50HJ015-025



See Legend on page 53.

*Included in power exhaust accessory.

OPERATING MODES

BP — Building Pressurization: Evaporator fan on, economizer energized to fully open position, power exhaust disabled.
E — Evacuation: Evaporator fan off, economizer energized to fully open position, power exhaust on (open).
SD — Complete Unit Shutdown: Breaks 24-v power to the thermostat.
SP — Smoke Purge: Evaporator fan on, economizer energized to fully open position, power exhaust on.

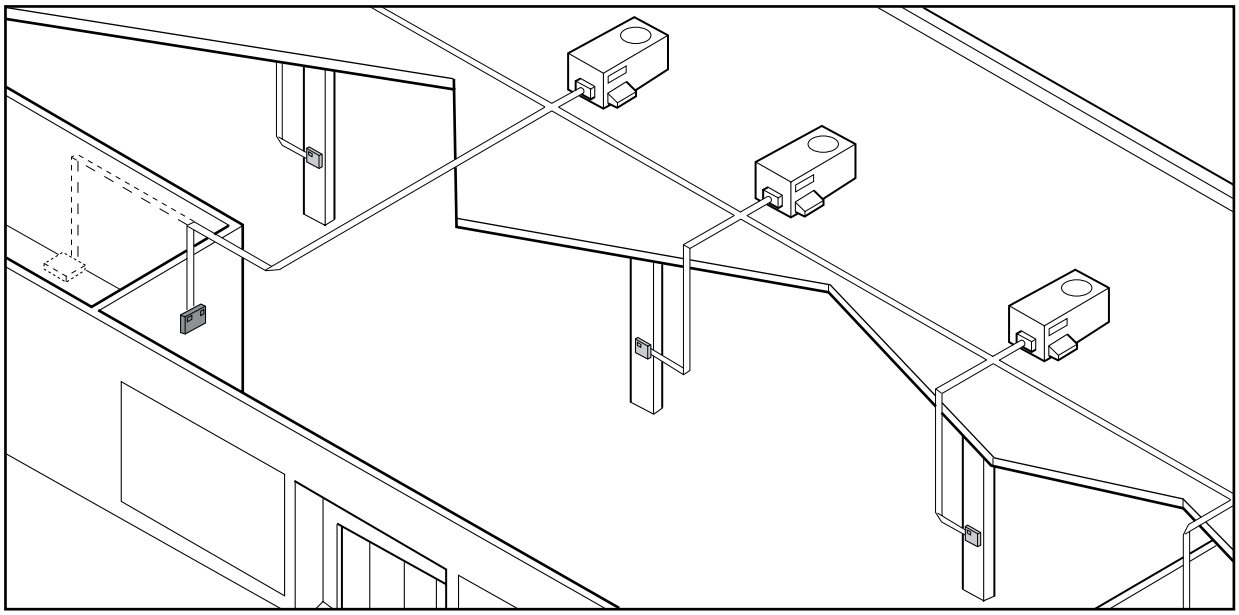
TEMP systems

A TEMP System is a network of communicating Carrier TEMP System Thermostats and rooftop, factory-mounted Apollo direct digital controls, each serving its own zone and heating/cooling unit. Networking allows your building manager to easily access each of your systems from a single location…whether they are in the same building or located throughout town.

The TEMP System's inherently flexible, modular base design supports the ***exact*** number of independent, single zone systems you require…no more, no less, no compromises.

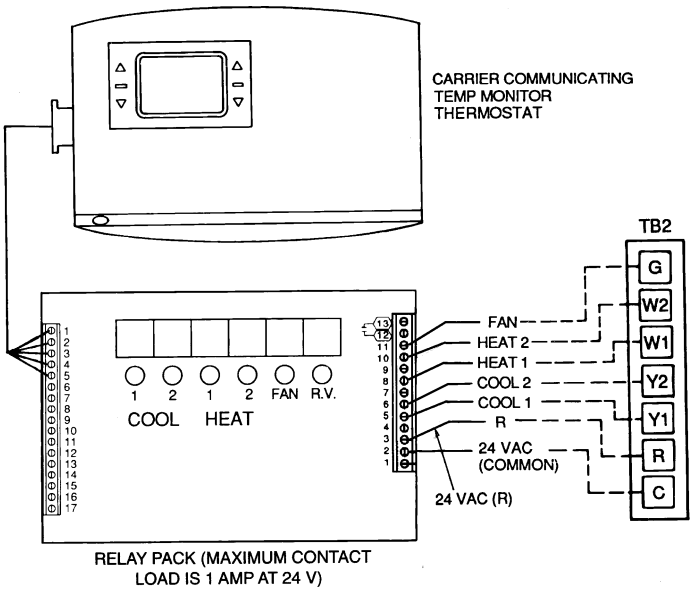
Ideal for department stores, small office buildings, fast food chains, schools, and hotels, a TEMP System is a cost-effective way to maintain comfortable building environments.

NOTE: Unit temperature rise must not be exceeded for proper unit operation.



TEMP SYSTEM THERMOSTAT (WITH TIMECLOCK) TEMP SYSTEM THERMOSTAT (WITHOUT TIMECLOCK)

STANDARD UNIT TYPICAL FIELD THERMOSTAT WIRING



LEGEND

TB — Terminal Block

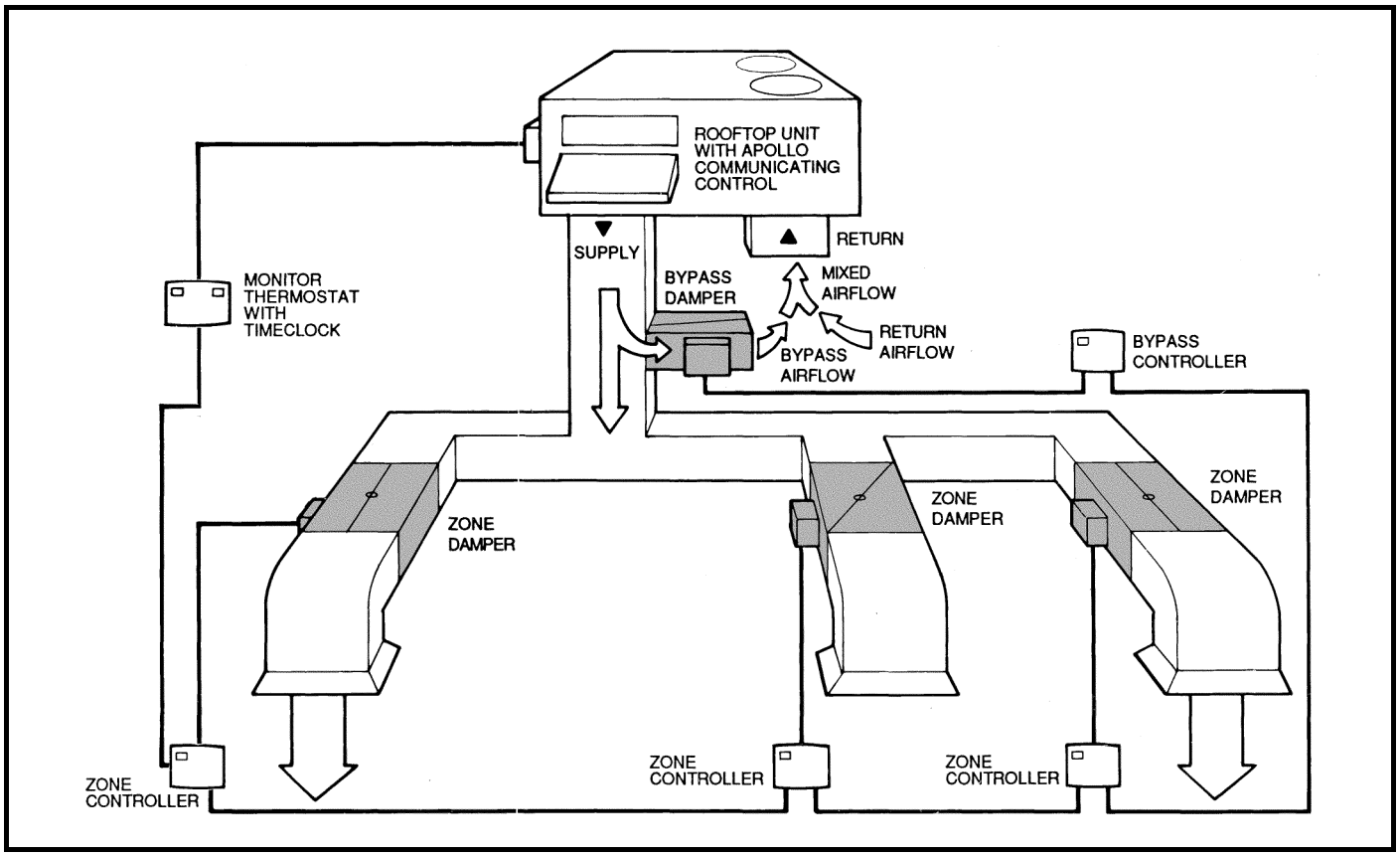
Controls (cont)

Variable Volume/Variable Temperature VVT® Systems

VVT Systems are dedicated to total building comfort. Carrier thermostats, zone dampers, and HVAC equipment with factory-mounted direct digital controls continually monitor and adjust their operation to ensure uninterrupted and personalized comfort for all occupants.

Through the use of communicating electronic controls, VVT Systems are able to provide the comfort of a multiple zone system while using the installation, operating and maintenance economics of single zone equipment…virtually putting an end to the cost vs comfort compromise.

NOTE: Unit temperature rise must not be exceeded for proper unit operation.



VVT® application guidelines

General — The VVT system is a zoning system that allows a single-zone heating/cooling system to operate as a multiple-zone system. For this system to function correctly and not adversely affect the reliability of the heating/cooling system, the information provided here must be followed.

There are two parts of the VVT system installation that are important for successful operation: the bypass damper and the HVAC (Heating, Ventilation, and Air-Conditioning) equipment configuration settings. The following information will provide important details for these two items as well as specific instructions for the 48/50HJ rooftop units. This information is intended as a supplement to the Installation Instructions shipped with both the 33CS system controls and the 48/50HJ rooftop equipment.

Bypass damper — The bypass damper and controller serve to accomplish two functions in the VVT system. First, the bypass damper keeps supply duct pressure and velocity down at partial load. This permits the VVT system to utilize standard low-velocity, low-pressure supply ductwork, duct insulation, and duct sealing methods. Without the bypass damper, the restriction of the zone dampers that are closing at partial loads would cause duct static pressure to climb, adding stress to all supply duct materials. Accompanying velocity and noise would create problems in the conditioned space.

Second, when the bypass damper is set up correctly, it ensures that the airflow through the HVAC equipment remains above the minimum required levels. (See capacity ratings on page 5 for minimum heating cfm required for proper operation of the rooftop heating system. These minimum heating cfm levels must be maintained during all phases of heating operation. The heating cfm values take precedence over listed minimum cooling cfm values.) This permits the use of constant volume rooftop units on VVT applications. Without the bypass damper, the restriction of the zone dampers that are closing at partial loads will reduce the airflow through the unit to below the minimum levels.

The installer is responsible for ensuring that the bypass controller is configured and the system is balanced so that the minimum airflow is higher than 300 cfm/ton. To accomplish proper configuration set the System Setup Enable Function (Category 5, option 7) to ON. This will close the bypass damper and force all of the zone dampers to open. The air balance should be completed after the zones minimum airflow has been set, verifying the total airflow through the equipment is above the minimum airflow level.

VVT bypass design layout — Particular attention must be given to bypass duct layout. It has been a source of VVT system operating problems when neglected. Proper layout consists of the five factors:

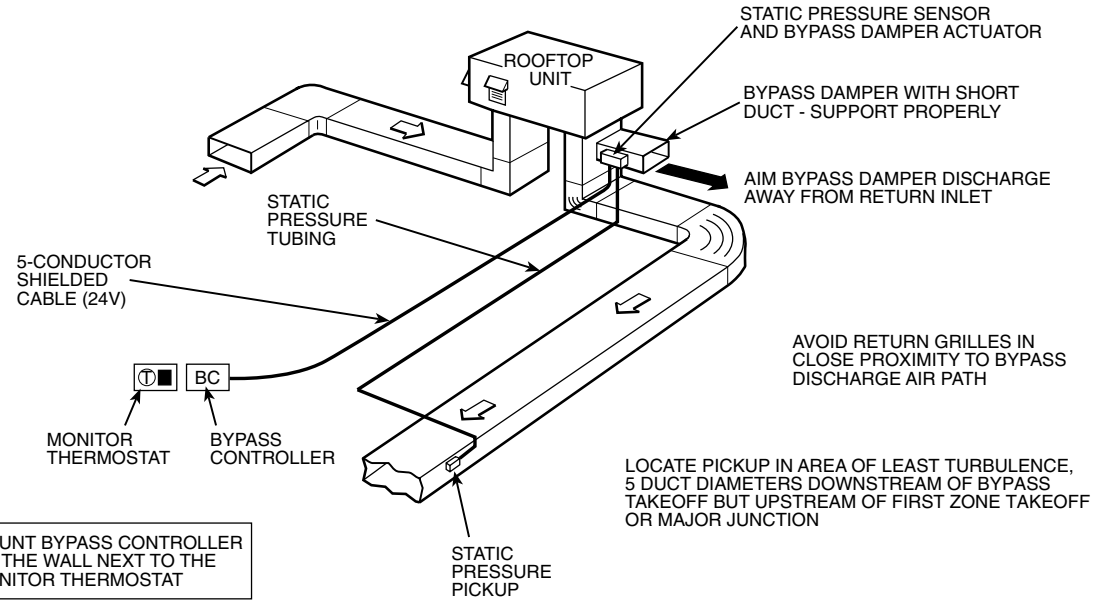
1. Proper location of the bypass
2. Adequately sizing the bypass
3. Avoiding short-circuiting of supply and return air
4. Proper location of the static pickup
5. Facilitating the mixing of bypass air with return air

The recommended location of the bypass damper is for it to duct the bypass air either into the ceiling plenum or into unoccupied spaces. See figure below for a typical installation. This method of installation prevents interference with intended fresh air intake through the unit and economizer operation.

It is highly recommended that the bypass damper is **not** ducted between the rooftop unit supply duct and the return duct as shown in the diagram below. This type of installation may result in the return duct becoming pressurized causing many problems such as:

- Preventing intended fresh intake for ventilation from entering the unit.
- Preventing proper operation of the economizer and causing mechanical cooling to energize needlessly.
- Preventing proper mixing of bypass air and return air resulting in low return temperatures in cooling, and high return temperature in heating.

VVT BYPASS DESIGN
CEILING PLENUM LAYOUT FOR MANUFACTURING OFFICE



Controls (cont)

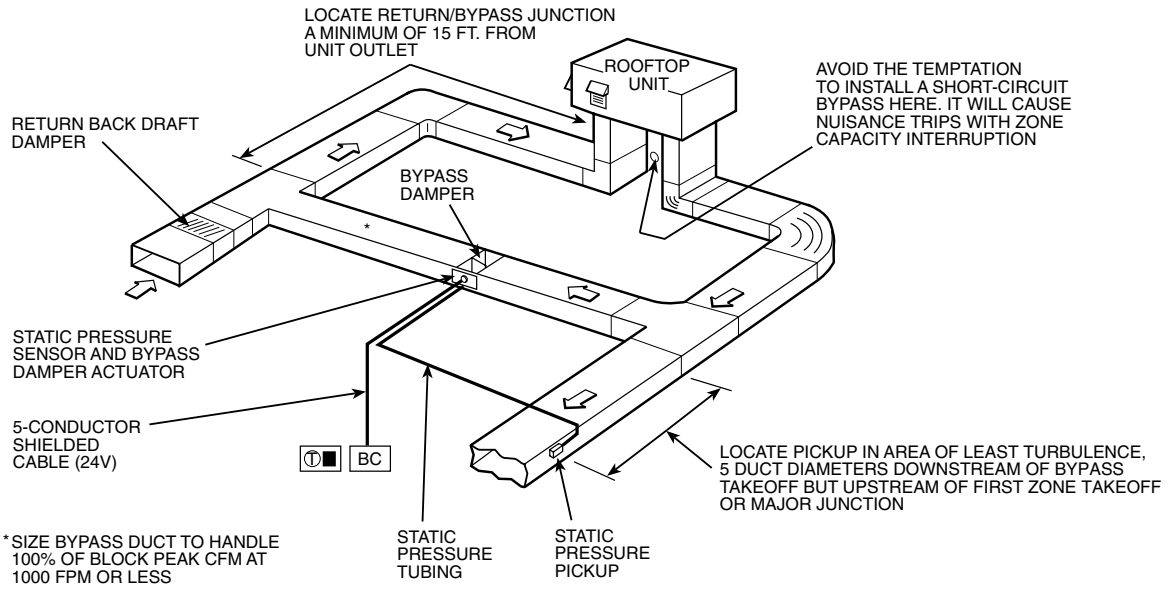
If the diversity within the space does not vary much, then bypass can be installed as shown in the diagram below successfully. Care must be taken to ensure that maximum bypass air at part load conditions does not exceed 25% of the full load airflow.

The bypass junction *must be* installed with sufficient duct length between it and the unit to allow complete mixing of the bypass air an the return air. Without adequate mixing, comfort control will be lost as the equipment will be cycled off and equipment failures may result if left at the extremes. When the HVAC equipment uses an economizer, a backdraft damper needs to be installed between the connection of the bypass duct and the closet room return air grille.

Bypass controller considerations — Besides considering the minimum and maximum cfm's required, as in the system design guidelines, the following are a few system concerns to consider when designing a bypass damper in a VVT® system.

1. The maximum amount of air being bypassed should match an equivalent amount of cfm of unconditioned air based on the ability of the system to unload. For example: If the equipment has two compressors and one unloader, then the refrigeration portion of the equipment is capable of unloading to about 25% of unit capacity. Therefore the designer should make sure the system will use 25% of the system cfm for comfort conditioning and bypass 75% of the conditioned air before energizing the compressors. This will ensure that the system will have enough return air mixing with the bypassed air to keep the compressor running. Make sure that the compressor does not cycle too frequently based on the leaving air temperature limits since this could lessen the reliability of the compressors. The heating equipment will only be able to unload 50%. The system may be designed to cycle based on the leaving air temperature limits depending on the rise designed in the heat exchanger and the amount of outside air being brought in. Although this is not efficient, the equipment reliability should not be a problem.
2. Be sure to verify the pressure drop across the bypass when in full bypass. The bypass should maintain the system pressure without causing 100% of the air to be bypassed. Tables are provided in the Comfort Systems Controls manual which will indicate the sound and performance criteria of Carrier dampers. Calculate Bypass of 4500 cfm on a unit with a nominal airflow of 6000 cfm and external static pressure of 0.50 inches. The ZD-16 has two entries in the table of 1475 and 1574. Three ZD-16 dampers in parallel could be used for the job. The 16 in. damper will not operate full open to produce these results, so it will be necessary to balance the system and set the maximum damper position to achieve these results in the field.
3. These airflows were tested at 0.50 in. wg and provided NC levels of 42 and 44 respectively. A noise criteria of around 40 would be acceptable for a ducted bypass with internally lined duct but probably not for externally lined ducts since the noise could be transmitted to the return registers. Duct design is important to consider in bypass design since improper noise levels can require the use of other dampers to achieve the same bypassed cfm with reduced noise. For the example above, two 35D, 16-in. dampers can move the same air at a NC level of 29.5 Radiated. These dampers can be ordered with sound attenuators to lessen radiated noise also. Use the damper test criteria to make the selection.
4. If designing a system with an economizer, be sure to include power exhaust on the equipment to prevent conditioned air from migrating out the return registers into the space in a over pressure condition. This condition can be identified since the doors will most likely stand open. The same condition can occur if there is a large exhaust system in the building for labs or restrooms.

VVT BYPASS DESIGN
DUCTED RETURN LAYOUT FOR MANUFACTURING OFFICE



Monitor thermostat configuration — The monitor thermostat controls the operation of its own zone and of each associated zone controller. The monitor thermostat determines system operation from the information received from each device that it controls. The monitor thermostat must be configured for proper control of the system. Part of the configuration is Category 4.0, which deals with HVAC settings. The Category 4.0 HVAC Equipment table shows the default settings for this category.

NOTE: In the majority of cases only categories 4.5, 4.6, 4.7, 4.8 and 4.15 will require changing by the installer.

Leaving-air temperature (LAT) monitoring must be always used. This function prevents the HVAC equipment from operating in a range that will cause equipment safety trips, leading to shortened equipment life.

The Constant Volume Electric Cooling/Heating and the Constant Volume Electric Cooling/Gas Heating tables provide the recommended cooling and heating limits that the monitor thermostat configures for 4.5, First Stage Cooling Limit; 4.6, Second Stage Cooling Limit; 4.7, First Stage Heating Limit; and 4.8, Second Stage Heating Limit.

There are tradeoffs involved in the selection of the system mode demand, monitor thermostat configurations 4.15. Lower setting levels tend to improve comfort but tend to increase operating costs and reduce equipment reliability. Buildings that have large core areas that are likely to make a call when others are not should use lower system mode demand levels. For buildings with zones that have more similar load patterns from zone to zone, or smaller zones or more uniformly sized zones, a higher setting should be used.

CATEGORY 4.0 HVAC EQUIPMENT — DEFAULT SETTINGS

SETTING	DESCRIPTION	CURRENT DEFAULT
4.1	Fan Operation	Off
4.2	Time Guard® Device between modes	On
4.3	Time Guard Device Override	Off
4.4	LAT Monitoring	On
4.5	First Stage Cooling Limit (F)	70 F
4.6	Second Stage Cooling Limit	60 F
4.7	First Stage Heating Limit	97 F
4.8	Second Stage Heating Limit	110 F
4.9	Auxiliary Relay (0= No Control, 1=Occupied Schedule, 2=IAQ, 3=Reversing Valve, 4=Economizer)	0
4.10	Optimize Staging	On
4.11	Cooling Temperature lockout	On
4.12	Cooling Lockout Set Point	45 F
4.13	Heating Temperature Lockout	Off
4.14	Heating Lockout Set Point	60 F
4.15	System Mode Demand	3
4.16	System Mode Re-Select (minutes)	30
4.17	Minimum Heat Run Time	5
4.18	Minimum Cool Run Time	3
4.19	Pre-occupancy Purge	Off
4.20	Fan Switch (0=Thermostat Switch Position, 1=Fan Switch On, 2=Fan Switch Off)	0
4.21	Cool Switch (0=Thermostat Switch Position, 1=Cool Switch Auto, 2=Cool Switch Off)	0
4.22	Heat Switch (0=Thermostat Switch Position, 1=Heat Switch Auto, 2=Heat Switch Off)	0

DX coil sensor installation — The use of a DX coil sensor is recommended. The DX temperature sensor should be installed in the ductwork as close to the equipment as possible. Care must be taken not to have the sensor within "line of site" of the equipment's heating elements. Radiation from the heat can cause the sensor to read an elevated reading.

The majority of the units referred to by these application guidelines are two compressor units. The monitor thermostat has the ability to read only one DX coil sensor, which can only be installed within the equipment on a single compressor unit. All of the LAT settings have been determined assuming supply duct temperatures versus coil temperatures. Be sure the DX coil sensor option is turned on. Category 5.6 under the monitor configurations, should be ON.

48/50HJ application guidelines — The 48/50HJ units are constant volume units and will require the use a bypass damper and controller. Refer to page 61 for details regarding the use and installation of the bypass damper.

These units use a TXV metering device.

Electrical connection from the VVT® system to the units will be the typical thermostat connections from the relay pack to the unit.

Refer to the tables below for LAT set points.

VVT LAT SET POINTS — 50HJ UNITS

UNIT	ELECTRIC HEATER kW	1ST STAGE COOLING LIMIT (F)	2ND STAGE COOLING LIMIT (F)	1ST STAGE HEATING LIMIT (F)	2ND STAGE HEATING LIMIT (F)
		CATEGORY 4.0 HVAC SETTINGS			
		4.5	4.6	4.7	4.8
50HJ015	15	45	49	93	93
	32	45	49	93	107
	55	45	49	95	126
50HJ017	32	64	50	93	107
	55	64	50	95	126
	80	64	50	114	147
50HJ025	32	64	49	90	100
	55	64	49	91	115
	80	64	49	105	131

VVT LAT SET POINTS — 48HJ UNITS

UNIT	1ST STAGE COOLING LIMIT (F)	2ND STAGE COOLING LIMIT (F)	1ST STAGE HEATING LIMIT (F)	2ND STAGE HEATING LIMIT (F)
	CATEGORY 4.0 HVAC SETTINGS			
	4.5	4.6	4.7	4.8
48HJD015	45	49	112	125
48HJF015	45	49	123	140
48HJD017	64	50	112	125
48HJF017	64	50	116	130
48HJD025	64	49	112	125
48HJF025	64	49	116	130

Application data

Ductwork
Ductwork should be attached to the curb on all units. Interior installation may proceed before unit is set in place on roof. If ductwork will be attached to the unit, do not drill in condensate drain pan area — leaks may result. See figures on page 65 for information on field-installed concentric ductwork when applicable.

Electric heat (50HJ015-025 only)
On 50HJ015-025 units with electric heat, a field-supplied 90-degree elbow must be installed on the supply ductwork below the unit discharge connection.

Thru-the-curb service connections
Roof curb connections allow field power wires, control wires, and gas supply (48HJ) to enter through the roof curb opening.

Thermostat
Use of 2-stage cooling thermostat is recommended for all units. A 2-stage cooling thermostat is required on units with accessory economizer to provide integrated cooling.

Heating-to-cooling changeover
All units are automatic changeover from heating to cooling when automatic changeover thermostat and subbase are used.

Airflow
Units are draw-thru on cooling and blow-thru on heating.

Maximum airflow
To minimize the possibility of condensate blow-off from evaporator, airflow through units should not exceed 500 cfm/nominal ton.

Minimum airflow
The minimum airflow for cooling is 300 cfm/nominal ton. Heating Capacities and Efficiencies table on page 5 for minimum airflow cfm for heating.

IMPORTANT: The minimum heating cfm must be maintained to ensure proper operation in the Heating mode. The minimum heating cfm value takes precedence over the minimum cooling cfm value.

Minimum ambient cooling operation temperature
Units are designed to operate at outdoor temperatures down to 40 F (4.4 C). To operate at lower outdoor-air temperatures, see Price Pages or contact your local Carrier representative for appropriate accessory combinations for specific applications.

Maximum operating outdoor-air temperature
For cooling, this temperature is 125 F (52 C). Refer to the Cooling Capacity tables on pages 25 and 26 for further details.

High altitude (48HJ015-025 only)
A change to the gas orifice may be required at high altitudes. Refer to Altitude Compensation chart on page 42.

Minimum temperature (48HJ015-025 only)
Air entering the heat exchanger in heating must be a minimum of 50 F (10 C) continuous and 45 F (7.2 C) intermittent. A field-supplied outdoor-air temperature control must be used to initiate both stages of heat whenever the entering-air temperature is less than 45 F.

Internal unit design
Due to Carrier's internal unit design (draw-thru over the motor), air path, and specially designed motors, the full horsepower (maximum continuous bhp) listed in the Physical Data table and the notes following each Fan Performance table can be utilized with extreme confidence.

Using Carrier motors with the values listed in the Physical and Fan Performance Data tables *will not* result in nuisance tripping or premature motor failure. The unit warranty will not be affected.

Field-supplied fan drives
If the factory drive sets must be changed to obtain other wheel speeds, consult the nearest Browning Manufacturing Co. sales office with the required new wheel speed and the data from Physical Data tables (center distances, motor and fan shaft diameters, motor horsepower) for a modified drive set selection. For minor speed changes, the fan sheave size should be changed. (Do not reduce the size of the motor sheave; this will result in reduced belt horsepower ratings and reduced belt life.)

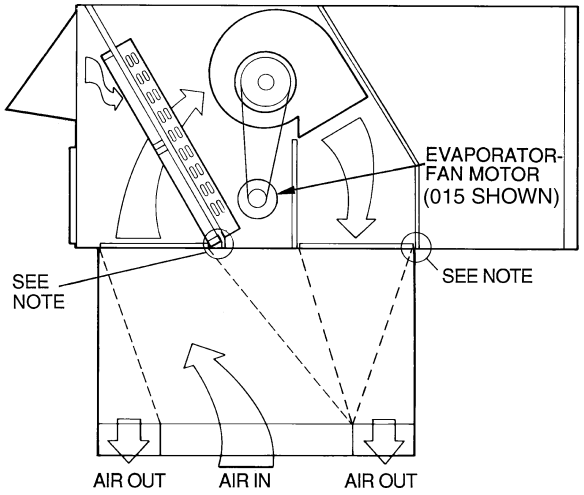
Apollo direct digital communicating controls
The Apollo direct digital controls must be used with either a Carrier master or monitor thermostat.

Condenser coil protection (*Enviro-Shield*™)
Pre-coated aluminum-fin coils have a durable epoxy-phenolic coating applied to the fin prior to the fin stamping process to provide protection in mildly corrosive coastal environments. Pre-coated coils have an inert barrier between the aluminum fin and copper tube. This barrier electrically disconnects the dissimilar metals to minimize the potential for galvanic corrosion. This economical option provides substantial corrosion protection beyond the standard uncoated coil construction.

Copper-fin coils provide increased corrosion resistance in moderate coastal environments where industrial air pollution is not present. All copper coils eliminate bi-metallic construction to eliminate the potential for galvanic corrosion. Application in industrial environments is not recommended due to potential attack from sulfur, sulfur oxide, nitrogen oxides, carbon and several other industrial airborne contaminants. In moderate seacoast environments, copper-fin coils have extended life compared to standard or precoated aluminum-fin coils.

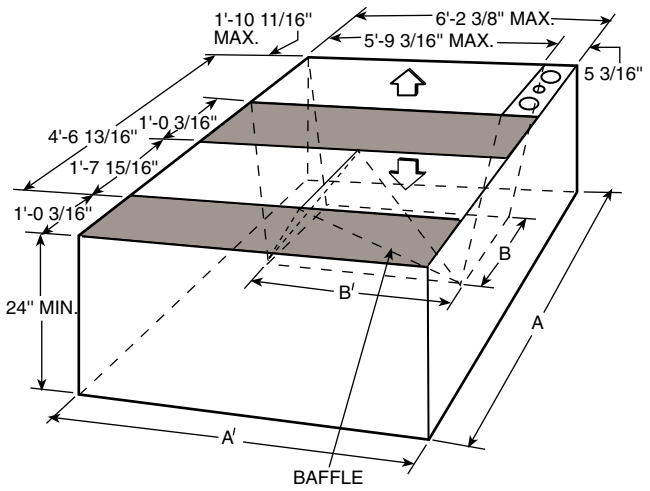
E-Coated aluminum-fin coils undergo a precisely controlled scientific process that bonds an impermeable epoxy coating to the specially prepared fin coil surface. E-Coating produces a smooth, consistent coating that is less brittle, more resilient and more durable than previous postcoating processes. E-Coated aluminum-fin coils offer economical protection and improved coil life in many contaminated environments.

CONCENTRIC DUCT AIR DISTRIBUTION



NOTE: Do not drill in this area, damage to basepan may result in water leak.

CONCENTRIC DUCT DETAILS



Shaded area indicates block-off panels.

NOTE: Dimensions A, A′ and B, B′ are obtained from field-supplied ceiling diffuser.

⚠ CAUTION

Concentric ducts may only be installed on units without electric heat. Personal injury or unit damage may result.

E-Coated copper-fin coils provide maximum protection in virtually all environments, this option combines the continuous, impenetrable barrier of the E-Coating process with the natural resistance of an all-copper construction. E-Coated copper-fin coil assemblies ensure long life, even in environments that combine harsh coastal conditions with industrial contamination.

MoistureMi$er dehumidification package

This option provides greater dehumidification by further subcooling the hot liquid refrigerant leaving the condenser coil. The MoistureMi$er package consists of a subcooling coil located on the leaving-air side of the evaporator coil. The location of the coil in the indoor stream enhances the latent capacity of the 48/50HJ rooftop units by up to 40%.

Many buildings suffer damage or have poor indoor-air quality due to overly humid conditions. Building humidity must be controlled for the following reasons:

1. Indoor-Air Quality:

   Humidity is a major factor in the growth and propagation of mold and mildew in a building. The mold and mildew can spread quickly and grow in carpets and ductwork and on walls, and often causes cases of Sick Building Syndrome. This syndrome can lead to employee absenteeism due to illness, lower worker productivity, and increased health care costs. The American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) recommends that relative humidity levels in buildings be maintained below 70%.

2. Comfort Levels:

   High humidity levels cause the occupied space to become uncomfortable because humidity interferes with the body's natural cooling process (evaporation at the skin surface).

3. Humidity damage:

   Humidity causes property damage such as stained wallpaper and ceiling tiles. Humidity can also damage books and artwork and create strong odors in carpets. In addition, humidity can contribute to unacceptable product quality in industrial processes.

4. Improper Ventilation:

   Buildings in hot and humid geographical areas cannot be properly ventilated due to high humidity levels outdoors, resulting in poor indoor air quality.

5. Equipment Inefficiency:

   Humidity can cause the inefficient operation of refrigerators and freezers.

6. Increased Energy Costs:

   Because of high humidity levels and less comfortable conditions, thermostat set points are lowered to force HVAC equipment to run longer and work harder to lower the humidity levels. Also, in an attempt to control humidity, system designers typically oversize HVAC equipment and add reheat capability to achieve the desired latent capacity. This results in higher initial equipment costs as well as increased energy expenses throughout the life of the unit.

Application data (cont)

Applications — There are many different rooftop unit applications that are susceptible to problems caused by high humidity levels. Some common applications include:

- Restaurants:

  The kitchen areas of restaurants have many humidity producing activities such as dish washing and cooking.
- Supermarkets:

  High humidity levels cause inefficiency in operation of refrigeration and freezer systems.
- Museums and Libraries:

  Humidity can damage books and artwork.
- Gymnasiums, Locker Room, and Health Clubs:

  Shower areas and human perspiration can cause uncomfortable high-humidity occupied space conditions.
- Hot and Humid Climates:

  The southeastern United States is a good example for this application. The MoistureMi$er dehumidification package becomes particularly useful when increased amounts of the hot and humid outdoor air needs to be brought into the building for proper ventilation.

**MoistureMi$er dehumidification package design effects —** To fully understand the operation of the MoistureMi$er dehumidification package, refer to the pressure-enthalpy curve and analyze the MoistureMi$er package effects on the refrigerant in the rooftop unit. The pressure enthalpy curve shows the refrigerant cycle for a 50HJ rooftop unit.

Standard unit refrigerant cycle — At point no. 1 in the pressure-enthalpy curve, the vapor leaving the compressor at a high pressure and a high temperature enters the condenser. The condenser removes heat from the refrigerant, lowers its temperature, and changes it to a liquid. At point no. 2, the liquid leaves the condenser and enters the Thermal Expansion Valve (TXV) that lowers the pressure of the refrigerant. At point no. 3, the liquid enters the evaporator coil where the refrigerant increases in temperature and changes back to a vapor. At point no. 4, the vapor leaves the evaporator and reenters the compressor.

Refrigerant cycle using the MoistureMi$er dehumidification package — When a subcooler coil is added to the rooftop unit, the refrigerant is affected in such a way that the unit latent capacity is increased. The refrigerant cycle follows the same path from point no. 1 to point no. 2 as the standard refrigerant cycle without a subcooler (see pressure enthalpy curve). However, at point no. 2, the liquid refrigerant enters the subcooler coil where the temperature is lowered further. At point no. 2A, this subcooled liquid enters the TXV, which drops the pressure of the liquid. At point no. 2B, saturated liquid and vapor enters the evaporator. The improved refrigeration effect can now be seen between point no. 2B and point no. 3. The increase in the total refrigeration effect is the additional enthalpy gained from point no. 2B and point no. 3. However, the subcooler coil rejects this added refrigeration effect to the air downstream of the evaporator coil, thus maximizing the overall latent effect. This improved latent effect is a direct result of the addition of the MoistureMi$er subcooler coil to the refrigerant cycle.

Latent capacity effects — Refer to the Psychrometric chart to see how the sensible heat factor decreases when the optional MoistureMi$er dehumidification package is installed. The chart contains data for the 50HJ unit operation, both with and without the MoistureMi$er at 1750 cfm. Point no. 1 on the chart represents the return-air dry bulb (80 F) and wet bulb (67 F) conditions. Point no. 2 represents the supply-air conditions for the standard 50HJ rooftop unit without the MoistureMi$er dehumidification package. Point no. 3 represents the supply-air conditions for a 50HJ rooftop unit with the MoistureMi$er package. By connecting point no. 1 and point no. 2 on the chart and finding the intersection on the sensible heat factor scale, the sensible heat factor is 0.73. Connect point no.1 and point no. 3 and see that the sensible heat factor is 0.58. This is a 17.5% increase in latent capacity for the given conditions. This increase in latent capacity allows the 50HJ rooftop units to remove more moisture from the conditions space; thus lowering the humidity levels.

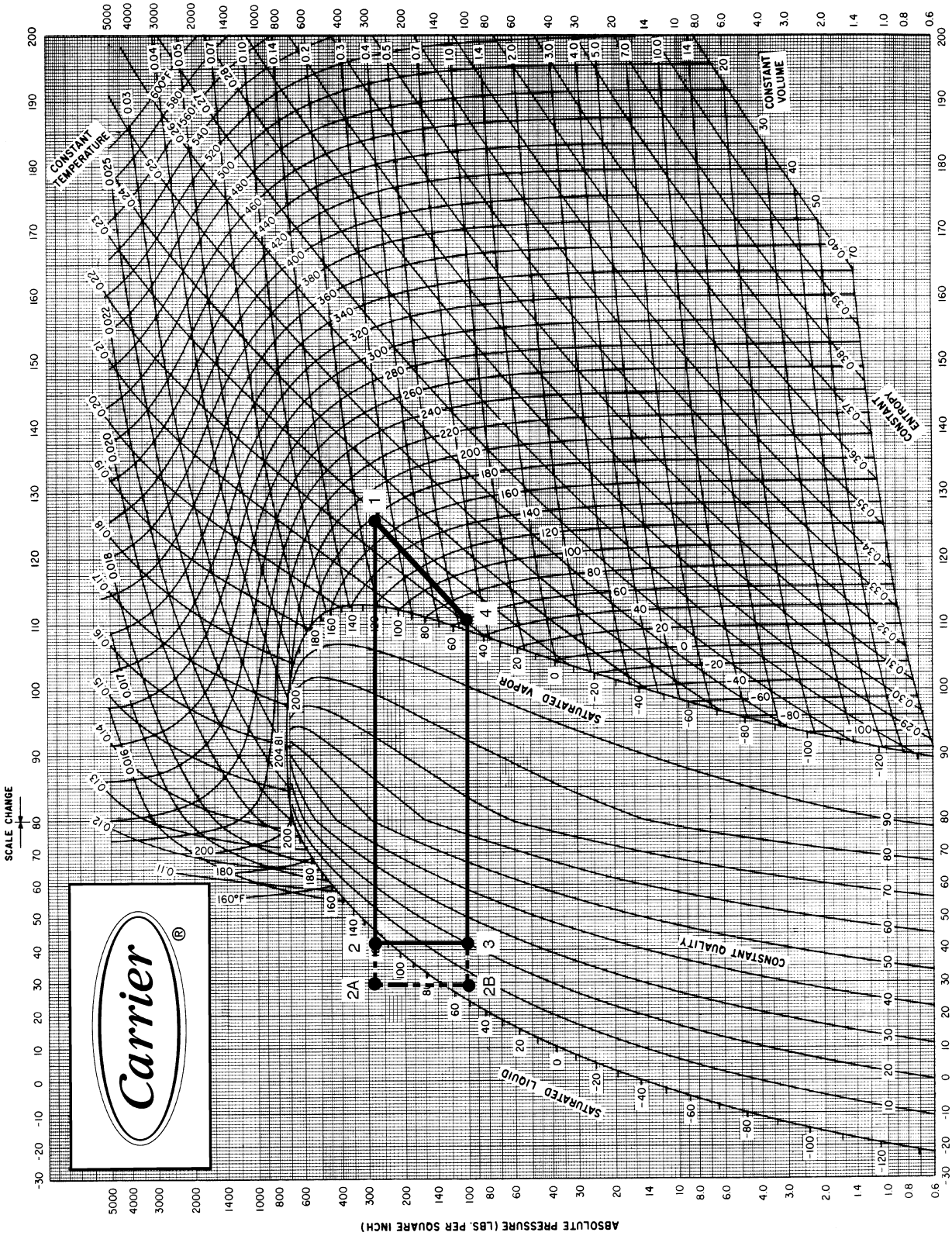
**MoistureMi$er dehumidification package operating performance —** MoistureMi$er dehumidification package operation does not affect the electrical data. The electrical data remains the same either with or without the MoistureMi$er package.

The operating and shipping weights will be slightly increased with the addition of the MoistureMi$er subcooler. See MoistureMi$er package weights in the Physical Data table for added base unit weight with this option.

Refer to cooling performance data, both with and without the MoistureMi$er dehumidification package. Note the greatly improved latent capacity with the MoistureMi$er dehumidification package.

Static pressure is also slightly affected by the addition of the MoistureMi$er dehumidification package. See Static Pressure Drop table when using this option.

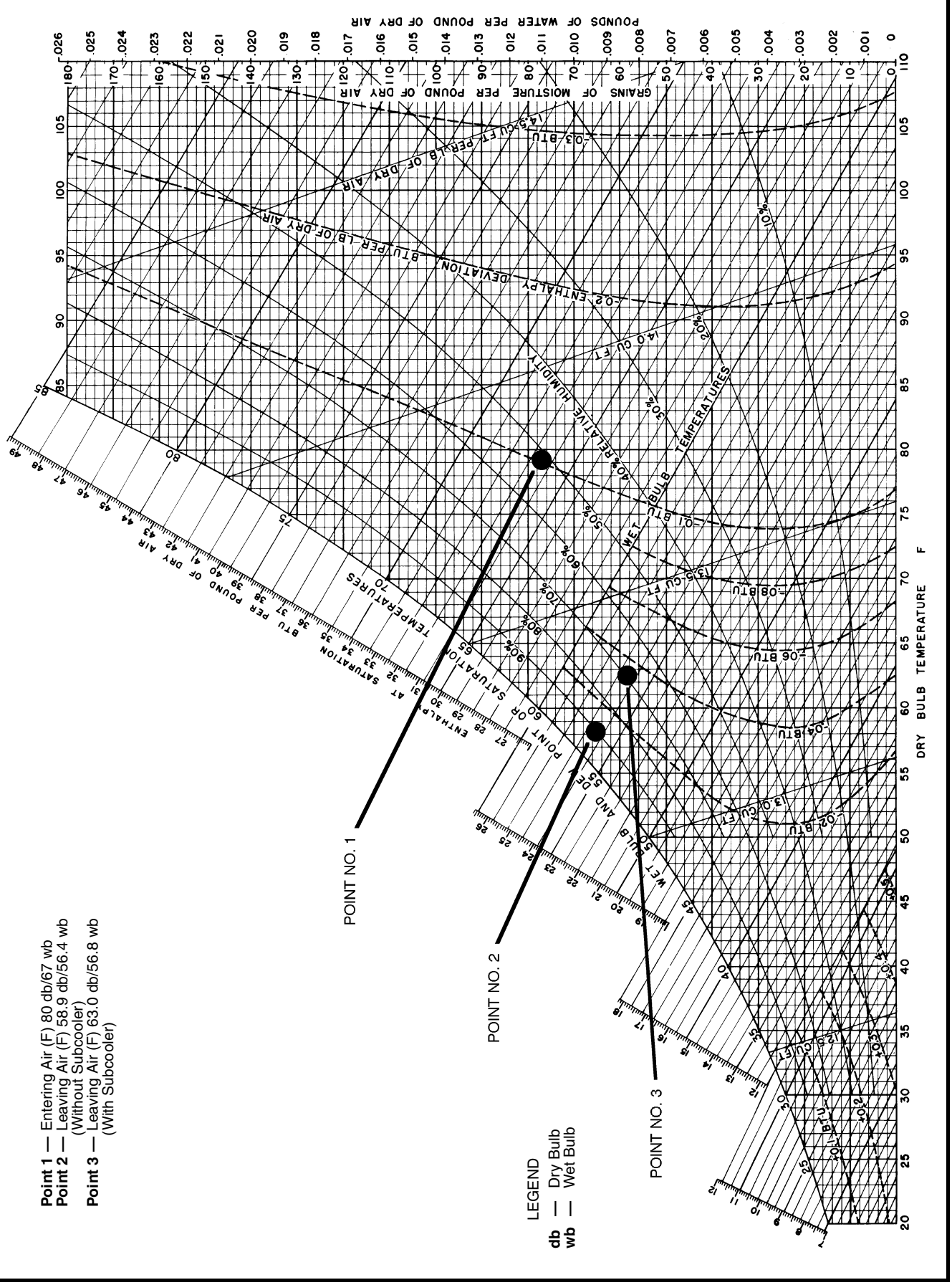
PRESSURE ENTHALPY CURVE



NOTE: Numbers 1 through 4 indicate point numbers referred to in MoistureMi$er Dehumidification Package Design Effects section.

Application data (cont)

PSYCHROMETRIC CHART



Point 1 — Entering Air (F) 80 db/67 wb
Point 2 — Leaving Air (F) 58.9 db/56.4 wb
(Without Subcooler)
Point 3 — Leaving Air (F) 63.0 db/56.8 wb
(With Subcooler)

Guide specifications — 48/50HJ015-025

Packaged Rooftop Electric Cooling Unit with Gas, Electric, or Glycol Heat — Constant Volume Application

HVAC Guide Specifications

Size Range: **12 to 20 Tons, Nominal (Cooling)**
172,000 to 360,000 Btuh, Nominal (Input Heating) (Gas Units)
14 to 80 kW (Electric Heat)
123,000 to 405,000 Btuh (Glycol Heating)

Carrier Model Numbers: **48HJD, 48HJF**
50HJ

Part 1 — General

1.01 SYSTEM DESCRIPTION

Unit is an outdoor rooftop mounted, electrically controlled heating and cooling unit utilizing scroll hermetic compressors for cooling duty and gas combustion for heating duty. Supply air shall be discharged downward or horizontally (with horizontal supply/return curb adapter assembly), as shown on contract drawings. Standard unit shall include a manual outdoor-air inlet.

1.02 QUALITY ASSURANCE

A. Unit shall be rated in accordance with ARI Standards 270 and 360 and all units shall be designed in accordance with UL Standard 1995.

B. Unit shall be designed to conform to ASHRAE 15.

C. Unit shall be ETL and ETL, Canada tested and certified in accordance with ANSI Z21.47 Standards as a total package.

D. Roof curb shall be designed to conform to NRCA Standards.

E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

F. Unit casing shall be capable of withstanding 500-hour salt spray exposure per ASTM B117 (scribed specimen).

G. Unit shall be manufactured in a facility registered to ISO 9002/BS5750, Part 2.

1.03 DELIVERY, STORAGE, AND HANDLING

Unit shall be stored and handled per manufacturer's recommendations.

Part 2 — Products

2.01 EQUIPMENT (STANDARD)

A. General:

The 48/50HJ unit shall be a factory assembled, single-piece heating and cooling unit. Contained within the unit enclosure shall be all factory wiring, piping, controls, refrigerant charge (R-22), and special features required prior to field start-up.

B. Unit Cabinet:

1. Constructed of galvanized steel (G90 — 1.8 oz. of zinc per square foot [550 grams per square meter] of sheet metal), bonderized and primer-coated on both sides and coated with a baked polyester thermosetting powdercoating finish on the outer surface.
2. Indoor blower compartment interior surfaces shall be insulated with a minimum $^1/_2$-in. thick, 1 lb density fiberglass insulation. Fiberglass insulation shall be bonded with a thermosetting resin (8 to 12% by weight nominal, phenol formaldehyde typical), and coated with an acrylic or other material that meets the NFPA 90 flame retardance requirements and has an ''R'' Value of 3.70. Aluminum foil-faced fiberglass insulation shall be used in the gas heat compartment.
3. Cabinet panels shall be easily removable for servicing. Cabinet panels are minimum 20 gage. Panels shall have $^1/_2$-in. thick, 1.5-lb. density insulation.
4. Filters shall be accessible through an access panel.
5. Holes shall be provided in the base rails (minimum 12 gage) for rigging shackles to facilitate overhead rigging.
6. Unit shall contain a sloped drain pan, to prevent standing water from accumulating. Pan shall be fabricated of hot dipped zinc coated minimum spangle steel. Zinc coating shall be G90 designation according to ASTM Standard A653. Unit shall contain a factory-installed nonferrous main condensate drain connection.

C. Fans:

1. Indoor blower (evaporator fan):
   a. Fan shall be belt driven. Belt drive shall include an adjustable pulley. The standard fan drive shall have a factory-installed low-medium static pressure fan drive. The alternate fan drive option shall have a factory-installed high static pressure fan drive.
   b. Fan wheel shall be made from steel with a corrosion resistant finish. It shall be a dynamically balanced, double-inlet type with forward-curved blades.
2. Condenser fans shall be of the direct-driven propeller type, with corrosion-resistant blades riveted to corrosion-resistant steel supports. They shall be dynamically balanced and discharge air upwards.
3. Induced-draft blower shall be of the direct-driven, single inlet, forward-curved, centrifugal type. It shall be made from steel with a corrosion-resistant finish and shall be dynamically balanced.

D. Compressor(s):

1. Fully hermetic, scroll type, internally protected.
2. Factory spring-shock mounted and internally spring mounted for vibration isolation.
3. On electrically and mechanically independent refrigerant circuits.

4. All compressors shall have 70 W crankcase heaters.

E. Coils:

1. Standard evaporator and condenser coils shall have copper or aluminum plate fins mechanically bonded to seamless internally grooved copper tubes with all joints brazed.
2. Coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).
3. Optional precoated aluminum-fin coils shall have a durable epoxy-phenolic coating to provide protection in mildly corrosive coastal environments. Coating shall be applied to the aluminum fin stock prior to the fin stamping process to create an inert barrier between the aluminum fin and copper tube. Epoxy-phenolic barrier shall minimize galvanic action between dissimilar metals.
4. Copper-fin coils shall be constructed of copper fins mechanically bonded to copper tubes and copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting the sheet metal coil pan to minimize potential for galvanic corrosion between coil and pan. All copper construction shall provide protection in moderate coastal environments.
5. E-Coated aluminum-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60 deg of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be aluminum fins mechanically bonded to copper tubes.
6. E-Coated copper-fin coils shall have a flexible epoxy polymer coating uniformly applied to all coil surface areas without material bridging between fins. Coating process shall ensure complete coil encapsulation. Color shall be high gloss black with gloss — 60 deg of 65 to 90% per ASTM D523-89. Uniform dry film thickness from 0.8 to 1.2 mil on all surface areas including fin edges. Superior hardness characteristics of 2H per ASTM D3363-92A and cross-hatch adhesion of 4B-5B per ASTM D3359-93. Impact resistance shall be up to 160 in./lb (ASTM D2794-93). Humidity and water immersion resistance shall be up to minimum 1000 and 250 hours respectively (ASTM D2247-92 and ASTM D870-92). Corrosion durability shall be confirmed through testing to be no less than 1000 hours salt spray per ASTM B117-90. Coil construction shall be copper fins mechanically bonded to copper tubes with copper tube sheets. Galvanized steel tube sheets shall not be acceptable. A polymer strip shall prevent coil assembly from contacting sheet metal coil pan to maintain coating integrity and minimize corrosion potential between coil and pan.

F. Heating Section (48 Series Units):

1. Induced-draft combustion type with energy saving direct-spark ignition system and redundant main gas valve.
2. a. The heat exchanger shall be of the tubular-section type constructed of a minimum of 20-gage steel coated with a nominal 1.2 mil aluminum-silicone alloy for corrosion resistance.
   b. The optional stainless steel heat exchangers shall be tubular-section design and shall be constructed of a minimum 20 gage, 409 stainless steel.
3. Burners shall be of the in-shot type constructed of aluminum-coated steel.
4. All gas piping shall enter the unit at a single location.
5. Gas piping shall be capable of being routed through the roof curb directly into unit.

G. Refrigerant Components:

Refrigerant circuit components shall include:

1. Thermostatic expansion valve (TXV).
2. Filter driers.
3. Gage port and connections on suction, discharge, and liquid lines.

H. Filter Section:

Standard filter section shall consist of 2 sizes of factory-installed 2-in. (51 mm) thick throwaway fiberglass filters of commercially available sizes.

I. Controls and Safeties:

1. Unit Controls:
   a. Economizer control (optional)
   b. Capacity control (2-step)
   c. Unit shall be complete with self-contained low-voltage control circuit.

2. Safeties:
    a. Unit shall incorporate a solid-state compressor lockout which provides reset capability at the space thermostat, should any of the following safety devices trip and shut off compressor:
        1) Compressor lockout protection provided for either internal or external overload.
        2) Low-pressure switch.
        3) Dual freezestats (evaporator coil).
        4) High-pressure switch.
    b. Supply-air thermostat shall be located in the unit.
    c. Heating section (48 Series) shall be provided with the following minimum protections:
        1) High-temperature limit switch.
        2) Induced-draft motor speed sensor.
        3) Flame rollout switch.
        4) Flame proving controls.
        5) Redundant gas valve.

J. Operating Characteristics:
1. Unit shall be capable of starting and running at 120 F ambient outdoor temperature per maximum load criteria of ARI Standard 360.
2. Unit with standard controls will operate in cooling down to an outdoor ambient temperature of 40 F (4.4 C).
3. Unit shall be provided with fan time delay to prevent cold air delivery.

K. Electrical Requirements:

All unit power wiring shall enter unit cabinet at a single location.

L. Motors:
1. Compressor motors shall be cooled by refrigerant gas passing through motor windings and shall have line break thermal and current overload protection.
2. All fan motors shall have permanently lubricated, sealed bearings and inherent automatic-reset thermal overload protection or manual reset calibrated circuit breakers.
3. All indoor-fan motors 5 hp and larger shall meet the minimum efficiency requirements as established by the Energy Policy Act of 1992 (EPACT) effective October 24, 1997.

M. Special Features:

Certain features are not applicable when the features designated * are specified. For assistance in amending the specifications, contact your local Carrier Sales Office.

* 1. Direct Digital Communicating Controls:
    a. Shall be available as a factory-installed option.
    b. Shall actively monitor all modes of operation, as well as evaporator-fan status, filter status, indoor-air quality, supply-air temperature, and outdoor-air temperature.
    c. Shall work with Carrier TEMP and VVT® systems.
    d. Shall have built-in diagnostics for thermostat commands for both staged heating and cooling, evaporator-fan operation, and economizer operation.
    e. Shall be equipped with a 5-minute time delay between modes of operation.
2. Roof Curbs (Horizontal and Vertical):
    a. Formed of 16-gage galvanized steel with wood nailer strip and shall be capable of supporting entire unit weight.
    b. Permits installing and securing ductwork to curb prior to mounting unit on the curb.
3. Horizontal Adapter Roof Curb:

    Includes factory-assembled adapter and internal duct and substantially improves evaporator fan static performance (static regain).

    NOTE: Power exhaust or barometric relief must be mounted in the return ductwork when used in conjunction with this accessory.

* 4. Integrated Economizer:
    a. Integrated type capable of simultaneous economizer and compressor operation to provide mechanical cooling while using outdoor air.
    b. Equipped with low-leakage parallel blade dampers not to exceed 3% leakage, at 1.0 in. wg (249 Pa) pressure differential.
    c. Damper motor is 24-v, spring return type design.
    d. Capable of introducing up to 100% outdoor air.
    e. Equipped with dry-bulb temperature control to govern economizer changeover.
    f. Equipped with a mixed-air sensor that controls the economizer to a 55° F (30.5° C) control point.
    g. Shall fit an outdoor-air opening of 17.75-in. high and 71.38-in. long (8.8 sq. ft).
5. Two-Position Damper:

    Two-position damper package shall include single blade damper and 24-v motor. Admits up to 25% outdoor air, and shall close upon unit shutoff. Damper shall cover 3.8-in. high by 17.75-in. wide (117.8 sq. in.) opening in return air upper panel.
6. Accessory Compressor Cycle Delay:

    Compressor shall be prevented from restarting for a minimum of 5 minutes after shutdown.

* 7. Thermostats and Subbases:

To provide staged heating and cooling in addition to automatic (or manual) changeover and fan control.

* 8. Barometric Relief Damper Package:

a. Package shall include damper, seals, hardware, and hoods to relieve excess internal pressure.

b. Damper shall close due to gravity upon unit shutdown.

c. Damper package must be field-installed in return-air ductwork when used with optional side return connections.

* 9. Power Exhaust:

Package shall include an exhaust (propeller style) fan, 1/2 Hp 208-230, 460 v (factory-wired for 460 v) direct drive motor, and damper for vertical flow units with economizer to control over-pressurization of building. Power Exhaust package must be field-installed in return-air ductwork when used with optional side return connections.

*10. Head Pressure Control Package:

Consists of an accessory outdoor-air package and a solid-state control with condenser coil temperature sensor for controlling condenser-fan motor speed to maintain condensing temperature between 90 F (32.2 C) and 100 F (43.3 C) at outdoor ambient temperature down to –20 F (–29.8 C).

11. Low-Ambient Kits:

When used, allows units to operate at lower outdoor ambient temperatures. Sizes 015 and 017 will operate down to 20 F. Size 025 will operate down to 25 F.

*12. Enthalpy Sensor:

a. For use with economizer only.

b. Capable of comparing heat content (temperature and humidity) of outdoor air and indoor air and controlling economizer cut-in point at the most economical level.

NOTE: Two accessory enthalpy sensors are required for differential enthalpy control.

*13. Electronic Programmable Thermostat:

Capable of using deluxe full-featured electronic thermostat.

14. Dehumidification Package:

The dehumidification package is a factory installed option that provides increased dehumidification by further subcooling the hot liquid refrigerant leaving the condenser coil. The package consists of a single row, 3/8 to 12.25 sq ft subcooling coil located on the leaving airside of the evaporator coil. The location of this coil in the indoor air stream greatly enhances the latent capacity of the 48/50HJ units.

The package shall be equipped with low pressure switch(es) and TXVs. Low pressure switch(es) prevents evaporator coil freeze-up and TXVs assure a positive superheat condition. If the operation of the subcooling coil is controlled by a field installed wall-mounted humidistat, the dehumidification circuit will then operate only when needed. Optional field connections for the humidistat are made in the low voltage compartment of the unit control box.

15. Winter Start Time-Delay Relay:

Used in conjunction with the accessory low-ambient kit or head pressure control device, permits operation in cooling at lower outdoor ambient temperatures. See price pages for more information.

16. Liquid Propane Conversion Kit (48 Series):

Kit shall contain all the necessary hardware and instructions to convert a standard natural gas unit for use with liquified propane gas.

17. Service Option Package:

a. Hinged access panels for the filter, compressors, evaporator fan, and control box areas. Filter hinged access panels permit tool-less entry for changing filters. Evaporator fan hinged access panel shall be field-convertible to a tool-less entry by removing and discarding screws. Each external hinged access panel shall be permanently attached to the rooftop unit.

b. Convenience outlet: Shall be factory-installed and internally-mounted with an externally accessible 115-v, 15 amp. GFI, female receptacle with hinged cover. Voltage required to operate convenience outlet shall be provided by a field-installed separate branch circuit.

c. Non-fused disconnect switch: Shall be factory-installed, internally-mounted, NEC and UL approved non-fuse switch shall provide unit power shutoff. The control access door shall be interlocked with the non-fused disconnect. The disconnect switch must be in the OFF position to open the control box access door. Shall be accessible from outside the unit and shall provide power off lockout capability.

18. Electric Heater Package (50 Series Units Only):

a. Fully assembled for installation. The packages are designed in accordance with UL safety standards 1995 and listed by ETL. Heater construction approved by UL 5306.

b. Heater element open coil resistance wire, nickel-chrome alloy, 0.29 inches inside diameter, strung through ceramic insulators mounted on metal frame. Coil ends are staked and welded to terminal screw slots.

c. Heater assemblies are provided with integral fusing for protection of internal heater circuits not exceeding 48 amps each.

d. Auto reset thermo limit controls, magnetic heater contactors (24 v coil) and terminal block all mounted in electric heater control box (minimum 18 ga. Galvanized steel) attached to end of heater assembly.

e. Certain models (208-230/3/60, 42/56 and 56/75 kW) require an additional heater control box that contains a field power terminal block, a field power wiring fuse block and fuses (125 A, 250 V, class K5 or RK%); included with the electric heater assembly package.

f. All power wiring leads are 10 AWG and control wiring leads are 18 AWG, both rated at 105 deg. C.

19. Glycol Coil (50 Series Units Only):

    Coil shall be 2-row copper tube ($^1/_2$-in. OD) with aluminum plate fins (590 fins/m; 15 fins/in.) and (41.28 mm; 1.625 in. OD) copper headers. Input and output connections shall be (41.28 mm; 1.625 in. ODM) copper stubs for sweat connections. Coil shall be furnished with suitable support rails, end plates, and hardware for ready field installation in heater compartment.

20. Alternate Drive:

    Shall provide higher static drive capability to enhance evaporator-fan performance rpm range.

21. Hail Guard, Condenser Coil Grille:

    Shall protect the condenser coil from hail, flying debris, and damage by large objects without increasing unit clearances.

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